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FRED W. VOGEL, Editor

Volume 6 OCTOBER, 1941 Number 1

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FROM every corner of the country, executives of manufacturing plants will gather on October 20th in Philadelphia to witness the opening of the 1941 National Metal Congress and Exposition. Cooperating in sponsoring this gigantic undertaking are the American Society for Metals, the Wire Association, the American Welding Society, and the Institute of Metal Division and the Iron and Steel Division of the American Institute of Mining and Metallurgical Engineers.

This exposition is undeniably the largest of its kind in the world and will afford those who attend this year an opportunity to study new methods and equipment for speeding defense preparations. Of vital importance to the manufacturing executives will be the National Defense group meetings on defense problems, conservation, and substitution. Outstanding government executives will deliver addresses on defense progress and the requirements in army, navy, aircraft, and civilian production.

Round table discussions on the most important phases of armament production headed by armament manufacturing experts will be featured. In addition to the foregoing, the big show which each year attracts many thousands of persons connected with the metal industry will be held in Philadelphia's Commercial Museum and Convention Halls.

Plan now to attend the National Metal Congress and Exposition, Philadelphia, Pennsylvania, October 20th to 24th.

OCTOBER, 1941 Vol. 5, No. 1

NATIONAL METAL CONGRESS AND EXPOSITION

THE National Metal Congress and Exposition, combining the metal world's largest industrial exhibit and sessions for principal technological societies dealing with metals, will meet in Philadelphia for five days beginning October 20th.

The 1941 Congress and Exposition will be the largest in the twenty-three year history of the event, according to Wm. H. Eisenman, managing director. More than 105,000 square feet of exhibit space have been taken by exhibitors representing every branch of the metals and associated industries. Extensive technical programs of the American Society for Metals, The American Welding Society, the Wire Association, and the Iron and Steel Division, and the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers will be held in conjunction with the show. Technical sessions are generally scheduled to be held in Philadelphia hotels as well as at the larger meeting rooms in the Convention Hall.

The theme of the 1941 National Metal Congress and Exposition is "NEW AIDS TO NATIONAL DEFENSE PRODUCTION"—an especially appropriate keynote by virtue of the gigantic defense program now under way. Every item and method to be seen will have direct relation to the preparedness program.

The welding industry will be represented at the metal show by all types of welding: arc, spot and resistance;

by gas welding and oxy-acetylene gas and gas cutting equipment. Included in this group are electrodes and electric controllers as well as various grades of welding wire for gas and electric welding.

Heat treating furnaces of all types will be on display: salt bath, annealing-electric, gas and oil fired; induction, atmospheric controlled furnaces of all types and sizes. In addition there will be furnaces and heating equipment for heating rivets and bars; industrial oil heating apparatus and various insulating materials for furnaces and electric heating elements.

In steels visitors will see tool steel, stainless steel, construction steel, valve steel for aircraft and automotive units, heat and corrosion resistant alloys, sheet, strip and high-speed and other steels. These will be shown in finished form and through products made from them.

In the non-ferrous field there will be aluminum, aluminum alloys, magnesium, magnesium aluminum alloys, copper, brass, bronzes, zinc, die casting shapes and forms, non-ferrous wire and other alloys cast and wrought. Machinery for die casting, wire drawing and spring forming will be shown.

The gas industry will be represented by gas fired, heat treating furnaces and many gas heating industrial appliances. Testing equipment to indicate hardness, tensile, torsional strength, fatigue and many other properties of metals will be demonstrated. Temperature recording and control equipment will include devices for indicating, recording and controlling temperatures.

Tools of all types will be on exhibit. They include hack saws and files, electric drills, diamond tools, tungsten carbide cutters, diamond test cutters and reamers. Included in this group are abrasive cutting machines and abrasive wheels.

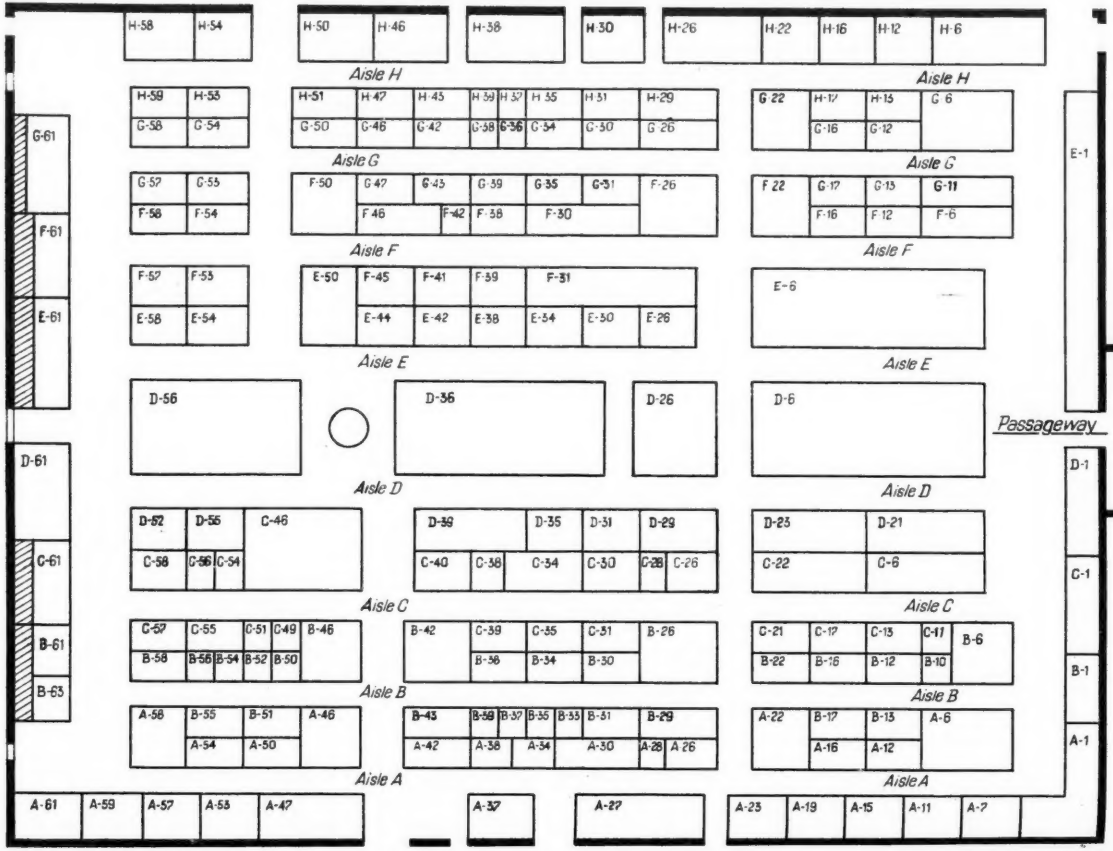
Plating processes and materials to be shown at the NMCE include plating equipment generators, plating barrels, polishing lathes, induction heating and hardening equipment and methods. Methods in castings will be illustrated, dealing with malleable heat treated and heat corrosion resistant items.

Hundreds of other aids to better production will be shown. They include heat treating salts, carburizing salts, compounds and supplies. Noble metals will be shown in new uses. Handling equipment such as cranes, trucks and hoists are included. Pieces of various optical measuring, metallographic and spectrographic equipment, blue printing machinery and drafting room equipment are to be exhibited. Laboratory equipment to be shown includes polishing machines, chemical determinators and other items for chemistry laboratory work.

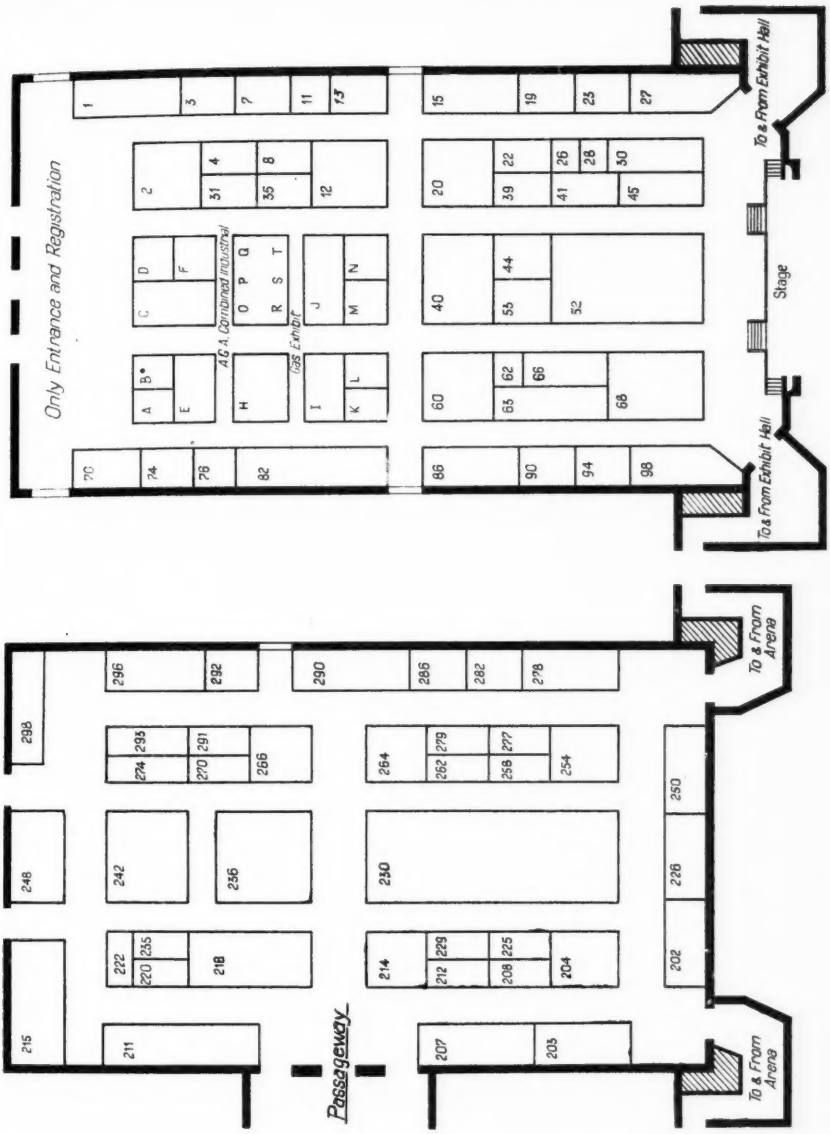
Ferro-alloys for production purposes will include nickel, molybdenum, vanadium, chromium, manganese and many other metals in this field. Fastener items to be shown include nuts, bolts, screws, rivets and lock washers. Hard surfacing alloys for various parts of industrial machinery will be on display.

Petroleum products, quenching oils, rust preventatives and metal cleaning compounds will be shown. Sand blast equipment and detergents will be included. Industrial appliances to be shown will include safety shoes, masks, goggles and other safety equipment as well as water dispensing equipment. X-ray equipment,

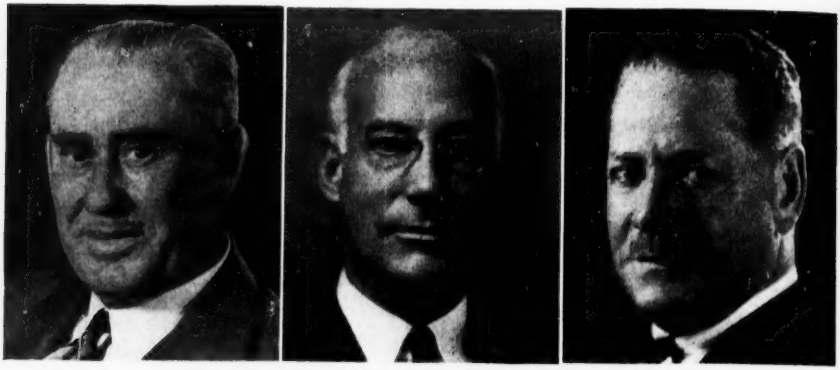
Floor Plan of Competitive



Comercial Museum Hall



Officers of American Society for Metals



O. E. Harder
President

Bradley Stoughton
President-Elect

W. H. Eisenman
Secretary

turbo compressors and metal cloth are included in the miscellaneous classifications.

Trade and business publications in the metals and associated fields have made arrangements to provide various informational services at their exhibit booths. Grade and professional associations, allied with the metals field, will be represented by exhibit booths. Technical programs arranged by the four societies are larger this year than ever before.

The American Society for Metals' technical program will present 60 papers in fourteen sessions and will include a symposium on "Controlled Atmospheres"; a lecture course to be presented on Thursday and Friday mornings.

The Edward de Mille Campbell Memorial Lecture will be delivered on Wednesday morning, October 22nd, following the annual meeting of the American Society for Metals. This year's Campbell Memorial Lecture will be prepared and delivered by Dr. Robert F. Mehl of Carnegie Institute of Technology.

The educational lectures on the ASM program include daily talks at 5 P. M. to be delivered by J. B. Austin of the U. S. Steel Corporation on "Heat Flow in Metals." Three evening lectures in the educational series will be delivered by S. R. Williams of Amherst College on the subject "Hardness and Hardness Measurements."

The American Society for Metals banquet will be held on Thursday evening, October 23rd, at Hotel Benjamin Franklin. Headquarters for ASM will also be at this hotel with morning technical sessions, afternoon and evening lectures to be held at the Convention Hall and Commercial Museum.

The annual fall meeting of the two metals divisions of the American Institute of Mining and Metallurgical Engineers, held during the first three days of the Congress will feature joint and simultaneous sessions, com-

mittee meetings and a round-table discussion on "Order-Disorder Phenomena." Headquarters for the Institute will be at the Ritz-Carlton Hotel.

Approximately 60 papers are tentatively scheduled for presentation by the American Welding Society in its general sessions and in its industrial and fundamental research groups. Headquarters for the AWS will be at the Bellevue-Stratford Hotel.

The Wire Association will present an interesting motion picture, "Wings of the Army," in addition to a select list of technical papers and discussions. Headquarters for this society have been announced for Hotel Philadelphian.

Government officials and production executives of defense equipment manufacturers plan a series of defense forums as the main feature of this year's National Metal Congress and Exposition. The purpose of these meetings will be the devising of means for increasing defense production and for the conservation of metal resources and substitutes.

Ranking members of the Office of Production Management, Office of Emergency Management, the Army and the Navy will represent the Washington high command at this timely production clinic.

From the numerous industrial contributors scattered about the nation will come leading metallurgists, production men, shop superintendents, efficiency engineers and other operating executives. By a frank discussion of their problems with the government men, an interchange of ideas and a revelation of the most pressing needs of the nation and its sister democracies, it is hoped to iron out throttling difficulties and lend new impetus to defense production.

All of the vast resources of the Metals Congress, its sponsor, the American Society for Metals and the other participating bodies, The American Welding Society, the Wire Association and the Institute of Metals Division, and the Iron and Steel Division of the American Institute of Mining and Metallurgical Engineers, will be brought to bear on the oiling of defense production machinery and gear it for increased speed and effectiveness.

With the international situation what it is and domestic defense production problems occupying a major portion of industry's attention, it is vital and essential that the program of the National Metal Congress and Exposition be projected along the lines of national service and toward conservation of our present resources while at the same time considering substitutes.

Inasmuch as the metal industry constitutes the bone and sinew of our endeavors to establish America as the arsenal of democracy, and because the Metal Congress is the recognized forum of the industry and metal processors, it is only natural to dedicate the Congress this year to the expediting of metal production and fabricating, so necessary to our national defense drive.

In view of these facts and the fact that a large majority of papers being prepared for the Congress and conventions of participating societies deal with subjects vital to those engaged in the arming program, it seemed highly desirable this year to have the main program supplemented by group meetings.

National Defense Group Meetings to Highlight National Metal Congress and Exposition

The 23rd National Metal Congress and Exposition to be held in Philadelphia for five days beginning October 20th will be headlined by a series of important National Defense Group Meetings on Defense Problems, Conservation and Substitution. The announcement is made by W. H. Eisenman, managing director of the Exposition and secretary of the American Society for Metals.

"It is felt that present conditions make it incumbent upon the Society to arrange for its members, for industry and others in attendance at the Metal Congress an intensive picture and study of the situation as it exists at the present time," Mr. Eisenman said. "It will present an opportunity to have conversant individuals indicate the future trends in important commodities and scarce materials."

Gathered together at one time and in one place in Philadelphia will be the outstanding authorities on manufacture, production and fabrication of metals who at these defense forum meetings will exchange experiences and help smooth out such difficulties and problems as have arisen in the manufacture of national defense material.

Thirteen special defense meetings will present more than a hundred specialists actively engaged in either industrial defense activities or government planning in the present emergency. Sessions will be held during late morning, afternoon and evening during the five days of the Metal Exposition. Invitations have been extended by the American Society for Metals to highest ranking officials from the War Department, Navy Department and the Supply Priorities and Allocations Board.

Afternoon sessions of the Defense meetings will begin promptly at 2:30 and will include the following topics on the days listed. The tentative outline of the program of these meetings is published on the following pages. Everyone who is interested in these meetings is urged to attend.

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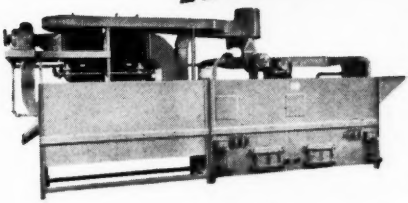

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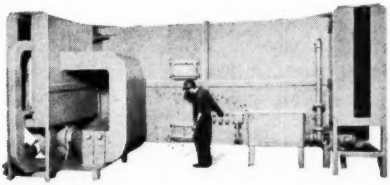

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A.S.M. National Defense Group Meetings on Defense Problems, Conservation and Substitution

PHILADELPHIA CONVENTION HALL, BALLROOM
MONDAY, OCTOBER 20th, 2:30 P. M.
Low Carbon Alloy Steels (Case Hardening Steels)

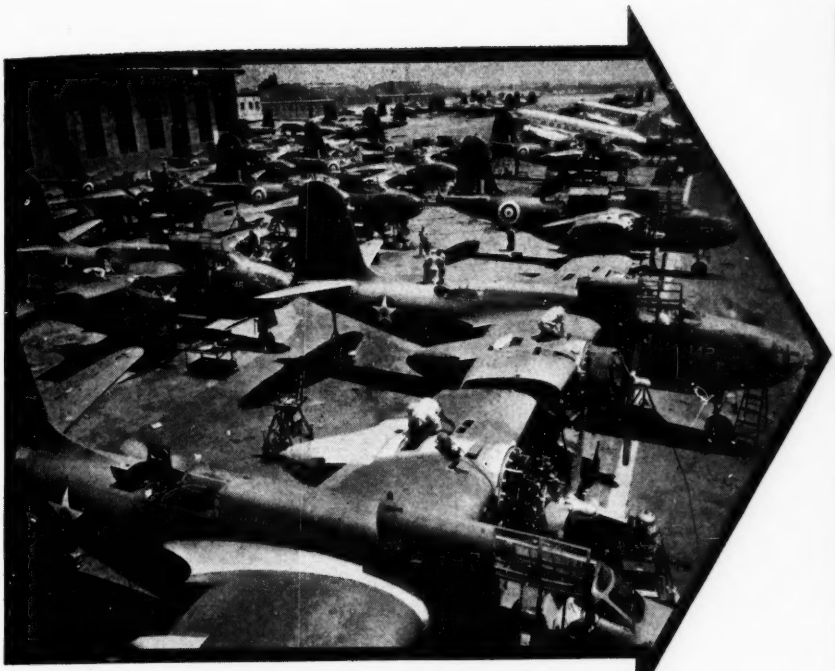
Leader: Gorton T. Williams, Met., Deere & Co.
Rept., Conservation & Substitution Com.
Summarizer: O. W. McMullan, Met., Youngstown Sheet & Tube Co.

Report from Conservation & Substitution Com.
Commonly Used Alloy Steels That Are Scarce or Unobtainable—
Walter Hildorf, Ch. Met., Engr., Timken Steel & Tube Co.
Suggestions About Substitutes That Will Not Run Into Other Bottlenecks—
E. T. Barron, Mgr., Met. Div., Pittsburgh, District, Carnegie-Illinois Steel Corp.
Comparison of 1 and 2 above as to:
Machinability
Speed of Carburization
Hardness of Case
Uniform Hardenability of Case
Strength and Toughness of Core
Nature of Quench
Amount of Distortion During Heat Treating—speaker to be announced
Possibilities of Flame Hardening
Induction Hardening
Salt Bath Hardening
} of steels in class 2 above—speaker to be announced
Changes in Mechanical Design of a Part to Permit Substitutes—speaker to be announced
Open Discussion and Question Period—
with above speakers acting as members of an Information Panel
Summary.....O. W. McMullan, Youngstown Sheet & Tube Co.

PHILADELPHIA CONVENTION HALL, ROOM 300
MONDAY, OCTOBER 20th, 8:00 P. M.
The Manufacture of Shells

Chairman: Arthur F. Macconochie, Head of Dept. of Mech. Engr., University of Virginia
Summarizer: to be announced

Shell Steel.....Speaker to be announced
Forged Shells.....Speaker to be announced
Cast Shells.....Speaker to be announced
Heat Treatment.....Speaker to be announced
Sand Blasting.....Speaker to be announced
Machining of Shells....John Haydock, Managing Editor, American Machinist
Cartridge Cases.....Speaker to be announced



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Open Discussion and Question Period—with speakers of above subjects acting as members of an Information Panel

Summary.....Summarizer to be announced

PHILADELPHIA CONVENTION HALL, BALLROOM
MONDAY, OCTOBER 20th, 8:00 P. M.
Problems in the Fabrication of Aluminum Base Alloys and Magnesium Base Alloys for Defense Material

Leader: E. H. Dix, Jr., Ch. Met., Aluminum Res. Labs., Aluminum Co. of America

Summarizer: Harry Huester, Met., Reynolds Metals Company

Aluminum Castings and Their Heat Treatment—
B. Clements, Met., Wright Aeronautical Corp.

Aluminum Forgings and Their Heat Treatment—
L. W. Davis, Chief Met., Forgings Div., Aluminum Co. of America

Aluminum Structural Shapes and Sheet, and Their Heat Treatment—
T. W. Bossert, Asst. Ch. Met., Fabricating Div., Aluminum Co. of America

Welding of Aluminum—
G. Hougland, Welding Engr., Aluminum Co. of America

Machining of Aluminum.....W. A. Dean, Aluminum Co. of America

Magnesium Castings.....Arthur Winston, Met., Dow Chemical Co.

Open Discussion and Question Period—with the above speakers acting as members of an Information Panel

Summary.....Harry Huester, Met., Reynolds Metals Company

PHILADELPHIA CONVENTION HALL, BALLROOM
TUESDAY, OCTOBER 21st, 2:30 P. M.
Higher Alloy Steels (Oil Quenching Steels)

Leader: M. A. Grossman, Ch. Met., Chicago District, Carnegie-Illinois Steel Corp.

Rept., Conservation & Substitution Com.

Summarizer: Harry McQuaid, Consultant, O.P.M., and Asst. Ch. Met. Republic Steel Corp.

Report from Conservation & Substitution Com.

Outline of Function of Principal Alloys in Steel—
E. C. Bain, Asst. to the Vice President, U. S. Steel Corp.

Commonly Used Alloy Steels That Are Scarce or Unobtainable—
(to be announced)

Standardization of Steel Specifications—C. L. Warwick, Consultant, Government Conservation Board, Div. of Purchases, O.P.M.

Suggestions About Substitutes That Will Not Run Into Other Bottlenecks
a. Means of Making Fine-Grained Steels
M. J. R. Morris, Ch. Met. Engr., Republic Steel Corp.

Evaluating the Hardenability of Steel—
Walter Jominy, Res. Engr., Chrysler Corp.

Comparison of 1 and 2 above, as to
Availability and Cost
Machinability at Normal and High Hardness Levels
Physical Properties Obtainable

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H. J. French, Mgr., Alloy Steel & Iron Development, International Nickel

Changes in Mechanical Design of a Part to Permit Substitution—
Speaker to be announced

Open Discussion and Question Period—with above speakers acting as members of an Information Panel

Summary.....Harry McQuaid, Consultant, O.P.M., and Asst. Ch. Met., Republic Steel Corp.

TUESDAY, OCTOBER 21st, 8:00 P. M.
PHILADELPHIA CONVENTION HALL, ROOM 300

Copper and Its Alloys in Defense

Leader: Harry Croft, Asst. Dir. Res., Cleve. Mill Div., Chase Brass & Copper
Rept., Conservation & Substitution Com.
Summarizer: Major Leslie S. Fletcher, Frankford Arsenal

Increasing Production by Elimination of Unnecessary Alloys—
D. K. Crampton, Dir. of Res., Chase Brass & Copper Co.

Standardization of Specifications—C. L. Warwick, Consultant, Government Conservation Board, Div. of Purchases, O.P.M.

Conservation of Copper Use of Temporary Substitutes
a. In Diversified Industry
b. In Electrical Industry
c. In Communications Industry
—Earl E. Schumacher, Bell Telephone Labs.

Use of Copper Alloys as Alternates for Scarce Metals—
Speaker to be announced

Copper and Its Alloys in Munitions Parts—
Lt. W. W. Culbertson, Frankford Arsenal

Copper in Iron and Steel for Defense Work—J. E. Jackson, Met. Engr., Copper, Iron and Steel Development Association

Open Discussion and Question Period—with above speakers acting as members of an Information Panel

Summary.....Major Leslie S. Fletcher

PHILADELPHIA CONVENTION HALL, BALLROOM
TUESDAY, OCTOBER 21st, 8:00 P. M.

Stainless and Heat Resisting Steels

Co-Chairmen:
Steel—A. L. Feild, Dir. of Res., Rustless Iron & Steel Corp.
Corrosion—R. J. McKay, International Nickel Co.

Report from Conservation & Substitution Com.

The Problem of Conservation
a. Substitutes for Decorative Uses—
C. E. Heussner, Chrysler Corp.
b. Use of Alloys of Lower Chromium and/or Nickel
16% Cr, 1½% Ni—Stanley P. Watkins, Mgr. Development Div., Rustless Iron & Steel Corp.
13% Cr and Al—R. A. Lincoln, Assoc. Dir. of Res., Allegheny-Ludlum Steel Corp.

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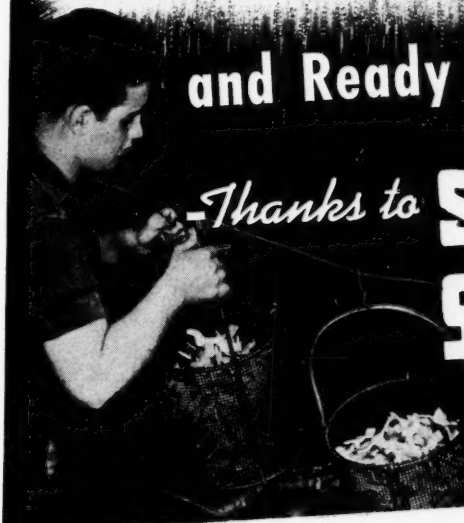

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c. Clad Materials—S. L. Hoyt, Battelle Memorial Institute
d. Conservation of and Substitution for Heat Resisting Alloys—Dr. M. A. Hunter, Tech. Staff, Driver-Harris Co.

2. The Problem of Substitution
a. Uses of Copper-Silicon and Other Copper Alloys—John Freeman, Tech. Mgr., American Brass Co.
b. Lead—R. L. Hallett, Ch. Chemist, National Lead Co.
c. Silicon Irons—D. E. Jack, Gen'l. Sales Mgr., Duriron Co., Inc.
d. Calorized Irons—B. J. Sayles, Calorizing Co.
e. Silicon Cementation—Harry K. Ihrig, Dir. of Labs., Globe Steel Tubes Co.
f. Manganese, Copper, Aluminum and Silicon as Substitutes for Cr and Ni in Quasi-Stainless Steels—Russell Franks, Met. Engr., Union Carbide & Carbon Res. Labs., Inc.
g. Silver and Platinum Lined Equipment—Fred E. Carter, Baker & Co.

General Discussion and Question Period—with above speakers acting as an Information Panel
Summary.....R. J. McKay, International Nickel Co.

PHILADELPHIA CONVENTION HALL, BALLROOM
WEDNESDAY, OCTOBER 22nd, 2:30 P. M.

High Strength, Low Alloy Steels
(Weldable Grades for Pressure Vessels, Piping, Ships, Rolling Stock)

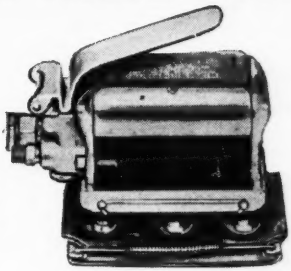
Leader: Col. Glenn F. Jenks, Ordnance Dept., U.S.A.
Rept., Conservation & Substitution Com.
Summarizer: James C. Hodge, Vice Pres., Wellman Engineering Co.

This discussion to confine itself to steels used as received from steel mills; the customer doing no heat treatment other than perhaps a stress relief.

Report from Conservation & Substitution Com.
Alloys Available to Give Strength Without Heat Treatment—A. B. Kinzel, Ch. Met., Union Carbide & Carbon Res. Lab., Inc.
Limits of Alloying Before Weldability Is Impaired—Leon C. Bibber, Welding Engr., Chicago-Illinois Steel Corp.
Substitutes for Scarce Alloys—B. D. Saklatwalla, Consultant, Alloys Development Corp.
Substitutions in Various Industries:
a. Railroad Rolling Stock—B. D. Saklatwalla, Consultant, Alloys Development Corp.
b. Pressure Vessels, Piping and Bolting—J. J. Kanter, Materials Res. Engr., Crane Co.
c. Large Forgings—F. B. Foley, Supt., Res. Dept., Midvale Co.
d. Ships' Hulls—Speaker to be announced
e. Bridges and Building Skeletons—Speaker to be announced

"SANDY" SAYS

"A GOOD MAN IS HARD TO GET THESE DAYS!"



"Full speed ahead on production!" That's the demand of the day—but if you can't get GOOD MEN, how can you fulfill that demand?

Well, one way is to eliminate "bottleneck" hand jobs—such as *hand sanding!*

For example, "SANDY" can do the work of *three hand sanders*—and give you as fine a finished sanding job as you could want . . . because "SANDY" operates at 3,000—⅝" strokes per minute!

That's why so many manufacturers in all kinds of industries have turned to "SANDY" to *TRIPLE* the speed of finish-sanding. We may be able to help you overcome bottlenecks caused by inadequate manpower, and thereby bring about *important savings* in your production costs. Put "SANDY" to work in your shop.

Sterling
TOOL PRODUCTS CO.
363 E. OHIO ST., CHICAGO

"I'LL DO YER SANDIN' THREE TIMES FASTER"

Fill out coupon — Paste on postcard — and Drop it in the Mail TODAY!

STERLING TOOL PRODUCTS CO.
363 E. Ohio St., Chicago, Ill. (F-4)

Please *RUSH* "Hints on Sanding Savings" to me at once!

*Company*_____

*Address*_____

*City*_____ *State*_____

*Att'n of*_____

Ultimate Conservation Due to Use of Less Stronger Special Metal Rather Than More of Weaker Common Metal—Merrill Scheil, Met., Res. Lab., A. O. Smith Corp.
General Discussion and Question Period—with above speakers acting as members of an Information Panel
Summary.....James C. Hodge, Vice President, Wellman Engineering Co.

PHILADELPHIA CONVENTION HALL, BALLROOM
WEDNESDAY, OCTOBER 22nd, 8:00 P. M.

The Inspection of Metals

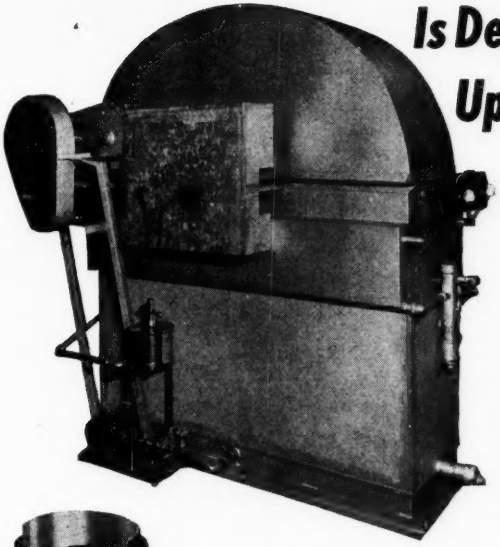
Leader: Dr. John W. W. Sullivan, Head, Inspection Div., Cleveland Ordnance District
Summarizer: Lt. Col. C. E. Davies, Office of Ch. of Ordnance, Industrial Service, Production Section

Principles of Inspection of Non-Ferrous Materials—E. E. Thum, Editor, Metal Progress
Principles of Inspection of Ferrous Materials.....Speaker to be announced
Principles of Aircraft Inspection.....Speaker to be announced
Inspection of Aircraft Engine Materials.....Speaker to be announced
Army Ordnance Inspection.....Brig. Gen. R. H. Somers, Ord. Dept. U.S.A.
Navy Ordnance Inspection.....Speaker to be announced
Marine Construction Inspection—Capt. Ralph T. Hanson, U.S.N., Supervisor of Shipbuilding, Cramp Shipbuilding Co.
Training of Inspectors—Capt. K. J. Soderberg, Civilian Personnel Div., Office of Chief of Ordnance, U.S.A.
Open Discussion and Question Period—with the above speakers acting as members of an Information Panel
Summary.....Lt. Col. C. E. Davies

PHILADELPHIA CONVENTION HALL, BALLROOM
THURSDAY, OCTOBER 23rd, 2:30 P. M.

Alloy Castings (Steel and Iron)

Co-Chairmen:
Iron Castings—A. L. Boegehold, Head, Metal. Dept., Res. Lab. Div., General Motors Corp.
Steel Castings—C. H. Lorig, Battelle Memorial Institute
Rept., Conservation & Substitution Com.
Report from Conservation & Substitution Com.
Function of Ni, Cr and V That are Scarce—A. W. Demmler, Met. Engr., Vanadium Corp. of America
Function of Mn That is Probably Obtainable—Fred Grotts, Pres., Ft. Pitt Steel Castings Co.
Function of Mo, Cu, Si, Ti, P That are More Plentiful—Harold S. Austin, Fdry. Supt., Buick Motor Car Div., General Motors Corp.
Utilization of (a) Classified Scrap—Victor Crosby, Fdry Engr., Climax Molybdenum Corp.
(b) Alloy Pig Iron—Victor Crosby, Fdry Engr., Climax Molybdenum Corp.

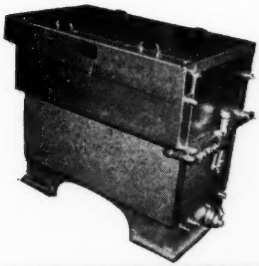


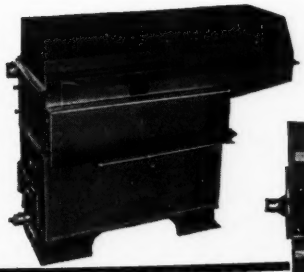
Is Degreasing Slowing Up Your Production and Cutting Into Your Profits?

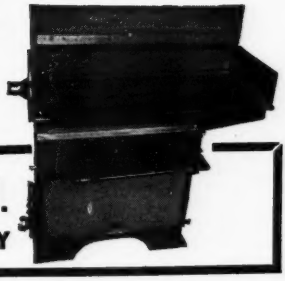
If so, why not let our engineers study your problem and give you their recommendations?

We are equipped to "tailor-make" a D'OILER Solvent Degreaser which will lower your operating costs, reduce solvent consumption and speed up production.

Send us complete details of your problem or ask our engineers to visit you.







MECHANICAL PROCESS CO.

SOUTH ORANGE NEW JERSEY

Ultimate Conservation Due to Over-All Economies of Stronger, More Machinable and More Durable Metal—Victor Crosby, Fdry. Engr., Climax Molybdenum Corp.

Situation in Various Important Industries

a. Automotive—J. L. McCloud, Met., Ford Motor Co.
b. Railroad—Samuel Z. Krumm, Met., The Buckeye Steel Castings Co.
c. Mining—Speaker to be announced
d. Power—Norman L. Mochel, Met. Engr., Westinghouse Elec. & Mfg. Co.
e. Chemical and Petroleum—M. T. Archer, Dir. of Res., National Supply Co.
f. Machine Tools—Herman Ewig, Fdry Mgr., Cincinnati Milling Machine Co.
g. Agricultural Machinery—H. Bornstein, Deere & Co.

Open Discussion and Question Period—with above speakers acting as an Information Panel

Summary.....C. H. Lorig

PHILADELPHIA CONVENTION HALL, ROOM 400
THURSDAY, OCTOBER 23rd, 2:30 P. M.

Bearings: Problems, Conservation and Substitution

Chair: Dr. O. E. Harder, Asst. Dir., Battelle Memorial Institute
Rept., Conservation & Substitution Com.
Summarizer: A. Allan Bates, Mgr., Chem. & Met. Dept., Westinghouse Electric & Mfg. Co.

Replacing Tin-Base Babbitts by Lead-base Babbitts—Carl A. Schwartz, Cleveland Graphite Bronze Co.

Substitutes for Bronze Bushings and Bearings—E. R. Darby, Dir. of Res., Federal Mogul Corp.

Problems and Substitutes in Powder Metallurgy Bearings—R. P. Koehring, Met., Moraine Products Div., General Motors Corp.

Cadmium-Base Bearings—C. F. Smart, Met., Pontiac Motor Div., General Motors Corp.

Silver Bearings.....Speaker to be announced

Bearing Substitutes in the Automotive Industry—Arthur F. Underwood, Head Mech. Engineering No. 5, Res. Laboratories Div., General Motors Corp.

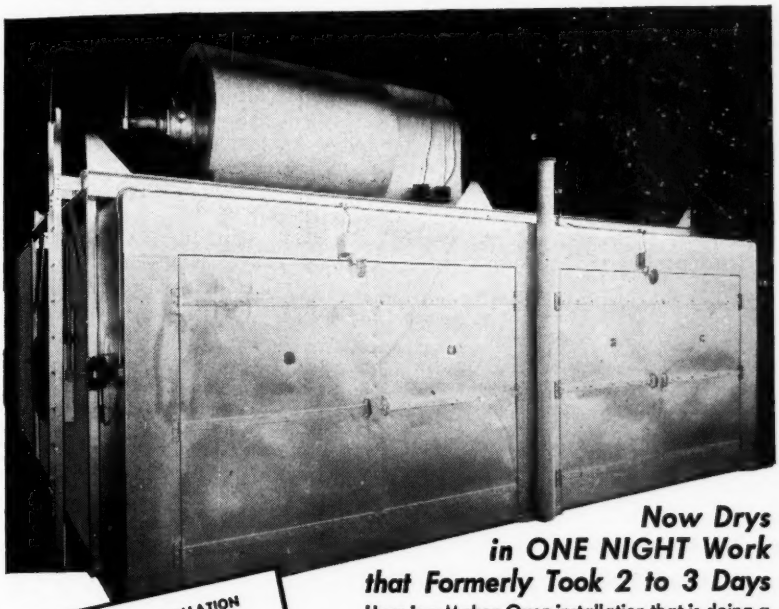
Problems in Aircraft Bearings.....George A. Zink, P. R. Mallory & Co.

The Use of Iron-Copper Bearings—A. J. Langhammer, Amplex Div., Chrysler Corp.

Open Discussion and Question Period—with the above speakers acting as an Information Panel

Summary—A. Allan Bates, Mgr., Chem. & Met. Dept., Westinghouse Elec. & Mfg. Co.

CORE *baking* OVEN



DETAILS OF INSTALLATION

The Core Baking Oven, pictured above, is a 2-compartment design, equipped with a gas fired single heating unit of sufficient capacity to operate the oven at any temperature up to 500°. Compartments may be operated independently or in unison. Trucks, running on rails embedded in cement floor, carry work in and out of the oven through full-opening doors to each compartment. Automatic safety controls prevent premature firing. Control cabinet is attached to side of oven while heating equipment, fans and motors are mounted compactly above, out of the way. Thoroughly insulated throughout. Capacity, 40 tons per charge.

Now Drys in ONE NIGHT Work that Formerly Took 2 to 3 Days

Here is a Mahon Oven installation that is doing a remarkable job for a large Illinois manufacturer. Carrying a load of 40 tons, this oven actually drys in ONE NIGHT the same volume of work that previously required two or three days to turn out—*and the cores come out bone dry.* YOUR oven equipment should operate with equal effectiveness and economy. Call in a Mahon engineer. You will appreciate the technical knowledge he can bring to bear on your problem. Consultation incurs no obligation.

THE R. C. MAHON COMPANY
DETROIT • CHICAGO

Designers and Manufacturers of Complete Finishing Systems, Metal Cleaning Machines, Rust Proofing Machines, Hydro-Filter Spray Booths, Drying and Baking Ovens, Dust Collectors, Filtered Air Supply Systems and Many Other Units of Special Production Equipment.

MAHON

PHILADELPHIA CONVENTION HALL, BALLROOM
FRIDAY, OCTOBER 24th, 2:30 P. M.

Molybdenum High Speed Steels and Tool Steels

Leader: Bradley Stoughton, Chief of Tool Section, O.P.M. Rept., Conservation & Substitution Com.
Summarizer: G. V. Luerssen, Met., Carpenter Steel Co.

Reports on Alloying Elements—
O.P.M. Committee's Report on the Heat Treatment of Molybdenum High Speed Steel
a. Operations—Chr., Norman I. Stotz, Met., Universal-Cyclops Steel Corp.
b. Furnaces and Controlled Atmospheres—Chr., C. I. Hayes, Pres., C. I. Hayes, Inc.
c. Salt Baths—Chr., Artemus F. Holden, Pres., A. F. Holden Co.
Tool Steels.....James P. Gill, Ch. Met., Vanadium Alloys Steel Co.
Open Discussion and Question Period—with the above speakers acting as an Information Panel
Summary.....C. V. Luerssen, Met., Carpenter Steel Co.

Puritan Platers and Polishers Handbook. Metal finishers may now obtain, on request, the new "Puritan Handbook," an interesting publication just released by the Puritan Manufacturing Co. of Waterbury, Conn., producers of buffing, polishing and cleaning compositions.

In addition to the informative articles covering Tripoli, and other buffing compositions the story of metal cleaning processes and the listing and description of various cleaners the handbook contains a wealth of information in the form of chemical engineering data including Tables of Chemical Terms, Comparative Specific Gravity, Temperature Comparisons and group photographs showing many products and parts that are finished with Puritan compositions.

Of special interest to manufacturers in this time of rush-demands is Pre-Saponified "Wonderbar" which readily dissolves in cleaning, making unnecessary several time consuming operations, prevents tarnishing and prepares the work for perfect plating—no rejects—no peeling.

Copy free upon request.

Wheelco Thermocouple Data Book and Catalog. A thermocouple data book and catalog which is said to contain the most complete compilation of data ever published for thermocouple users is now being issued by Wheelco Instruments Co., Harrison and Peoria Sts., Chicago, Ill. The 32 pages of this catalog contain such valuable information as temperature conversion tables, millivolt tables, pipe and wire sizes, decimal equivalents, wire resistances, recommendations for checking thermocouples and pyrometers, information on how to construct thermocouples, and so on.

Prices and descriptions are given on the complete line of Wheelco thermocouples and thermocouple accessories, wire, lead wire, heads, connectors, plug and socket assemblies, insulators and protecting tubes. Recommendations and information given are presented as concisely as possible. Thermocouples can be selected and ordered direct from this book.

A copy will be sent free upon request.

Motor Generators for Electroplating, Anodizing and Special Applications. Motor Generator Corporation of Troy, Ohio, has just published a pamphlet describing their latest models of motor generator sets, electroplating sets, and anodizing sets. Copies of the publication may be obtained free of charge by writing the company.

Mention PRODUCTS FINISHING when writing to advertisers. Your cooperation will be appreciated both by the advertiser and this magazine.

STILL GOOD *after handling* 10,000 TONS *of Nuts and Bolts...*

Record made by this type of basket proves Monel-equipped Pickling Room is no bottle neck

One sure way to speed pickling room production is by using Monel equipment. Proof? Consider the experience of United Platers, Inc. of Detroit:

Because inferior equipment caused loss of production, United changed to Monel for pickling baskets. Result: Eight Monel baskets like those pictured have handled 10,000 tons of nuts, bolts, washers, and are still in good condition.

Today, in the pickling room, you want no breakdowns but *faster production.* Strong, lightweight equipment of Monel is the answer. Write for full information on how to get it. Address:

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street New York, N.Y.

MONEL

"Monel" is a registered trade-mark of The International Nickel Company, Inc., which is applied to a nickel alloy containing approximately two-thirds nickel and one-third copper.

Monel dipping baskets made by Naum Saba, 2266 E. Congress, Detroit, for United Platers, Inc., 944 Madison St., Detroit. Eight similar baskets still good after handling 10,000 tons of nuts, bolts and washers.

EXHIBITORS at the NATIONAL METAL SHOW

ABRASIVE COMPANY
Philadelphia ***Booth G-39***

Exhibiting: Grinding wheels and abrasive materials. A balancing ways assembly will be shown illustrating perfect balance of our grinding wheels.

In attendance: R. S. Trimble and W. E. Reed, sales representatives; D. S. Saurman, advertising manager; and W. B. Ilko, sales manager.

ACME ELECTRIC WELDER COMPANY
Huntington Park, Calif. ***Booth A-6***

See Resistance Welders Manufacturers Association.

ACME INDUSTRIAL COMPANY
Chicago ***Booth H-51***

See Charles R. Yerger Company.

ADIRONDACK FOUNDRIES & STEEL COMPANY
Watervliet, N. Y. ***Booth 298***

See Steel Founders' Society of America.

ADVANCE POLISHING WHEELS, INC.
Chicago ***Booth G-34***

Exhibiting:

In attendance: J. J. Manderscheid, president; John Welhaven, superintendent; and George O'Connell, production manager.

AJAX ELECTRIC COMPANY, INC.
Philadelphia ***Booth 211***

See Ajax Electrothermic Corporation.

AJAX ELECTROTHERMIC CORPORATION
Trenton, N. J. ***Booth 211***

ALLEN MANUFACTURING COMPANY
Hartford, Conn. ***Booth B-39***

In attendance: C. J. Meister, field sales manager; W. D. Horner and W. E. Tracy, district representatives.

Exhibiting (in operation): Safety set screws; pressure-formed cap screws; flat head cap screws; tru-ground dowel pins; tru-ground shoulder screws; and pipe plugs. A laboratory machine will show the holding power of Allen screws under tense vibration.

ALLIS-CHALMERS MANUFACTURING COMPANY
Milwaukee ***Booth 86***

ALOX CORPORATION
Niagara Falls, New York ***Booth 62***

In attendance: W. H. Clark, president; A. W. Burwell, vice president; J. E. Shields, research and sales engineer; H. F. Brewer, Eastern manager of sales; and B. G. Spice, Midwest manager of sales.

Exhibiting (in operation): Polar type film forming corrosion preventive compounds will be on exhibit and panels coated with these compounds will be shown. Par-alketone base inhibitors and solutions containing these bases will be shown, such as those used for the protection of the exterior surfaces of aeroplanes shipped abroad. Corrosion testing procedures will be on demonstration.

New organic water soluble, oil soluble corrosion inhibitors will be shown for the first time. Such inhibitors are suggested for the control of corrosion in aqueous systems, and others such as, alcohol-metal-water, gasoline-metal-water.

Substantially pure petroleum acids will be exhibited ranging from the liquid to the solid type. These acids are suggested for the substitution of animal fats in lubricants.

ALUMINUM COMPANY OF AMERICA
Pittsburgh ***Booth 52***

In attendance: F. L. Gemmer, in charge of booth and members of the research and technical staffs.

Exhibiting: Aluminum Company of America and American Magnesium Corporation have a combined exhibit consisting of a series of information booths on "How to Do Things" with Alcoa aluminum and Mazlo magnesium. These booths will be manned by experts who can answer questions regarding such things as welding, heat treating, machining, forming, riveting, etc. Ample quantities of booklets available on the various subjects covered in our display.

Although aluminum or magnsium is not available for civilian purposes, yet a greater amount of both metals is being fabricated today than ever before. This has brought about a flood of inquiries on how to work the metals, so this exhibit will be more helpful than anything to assist those in need of such information. Also included will be a small space occupied by another one of our subsidiaries, namely, the Aluminum Ore Co. This space will be used for a display on Alorco activated alumina which is the material used for drying gases and liquids. Apparatus employing activated Alumina will be on display.

ALUMINUM ORE COMPANY
Booth 52

See Aluminum Company of America.

ALVEY FERGUSON COMPANY
Cincinnati, Ohio ***Booth C-54***

AMERICAN BRAKE SHOE & FOUNDRY COMPANY
Chicago Heights, Ill. ***Booth D-23***

See American Manganese Steel Division.

AMERICAN BRASS COMPANY
Waterbury, Conn. ***Booth 278***

AMERICAN BRIDGE COMPANY
Pittsburgh ***Booth, Stage***

See United States Steel Corporation.

AMERICAN CAR AND FOUNDRY COMPANY
New York ***Booth 270***

In attendance: F. C. Cheston and H. C. Cheston, sales agents; and W. J. Bisset.

Exhibiting (in operation): Electrode rivet heater, fully automatic for heating bars or any section desired. Designed for various size rivet or bars. The temperature is controlled by an electirc eye. The fully automatic heater does away with an extra man at the furnace.

AMERICAN CHAIN & CABLE COMPANY
Bridgeport, Conn. ***Booth A-27***

AMERICAN FOUNDRY EQUIPMENT COMPANY
Mishawaka, Ind. ***Booth D-61***

AMERICAN GAS ASSOCIATION
New York

Combined Industrial Gas Exhibit.

AMERICAN GAS FURNACE COMPANY
Elizabeth, N. J. ***Booth C***

In attendance: P. C. Osterman, vice president; E. C. Cook, G. A. F. Machlet, F. J. Schweizer, J. Mehrman, T. Farwick, Sr., W. J. Barenscheer, O. T. Muehlemeyer, S. C. Dinsmore, W. A. Stumpf, W. H. Kelsey, Porter Hurd, A. N. Mason, W. L. Speece, G. Schwab, W. E. Sturmer, and H. F. Barton.

Exhibiting (in operation): Small production reciprocating clean hardening machine and large machine of the same kind to demonstrate the size range. Small appliances of various kinds. Burners of all kinds. Demonstration of glass blowing.

AMERICAN GASIFIER COMPANY
Wallingford, Conn. ***Booth F-54***

AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS
New York ***Booth 293***

AMERICAN MACHINE AND METALS, INC.
East Moline, Ill. ***Booth D-29***

See Riehle Testing Machine Division.

AMERICAN MACHINIST
New York ***Booth 3***

AMERICAN MAGNESIUM CORPORATION
Booth 52

See Aluminum Company of America.

AMERCAN MANGANESE STEEL
DIV. OF AMERICAN BRAKE SHOE & FDY. CO.
Chicago Heights, Ill. ***Booth D-23***

In attendance: J. B. Terbell, vice president; W. C. George, sales engineer; W. G. Atkinson, sales representative; W. G. Hoffman, manager alloy department; E. A. Lerner, assistant manager, alloy department; E. L. Quinn, manager, welding products division; and D. B. Rice, assistant manager, welding production division.

Exhibiting: Amsco Alloy Heat Resisting Castings, particularly carburizing and heat treating containers, including the Hoffman Flexbox sectionalized container developed by this company, and Amsco Reclamation and hard surfacing welding materials.
Some welding demonstrations, using arc welding equipment.

AMERICAN METAL MARKET
New York ***Booth A-19***

In attendance: S. P. Trench, vice president; R. A. Langer, secretary; and S. Glassford, circulation manager.

Exhibiting: Specimen copies of American Metal Market, the pioneer daily newspaper of the iron, steel and metal industries. Established in 1882 and published daily since 1899. Widely recognized as the market authority and for the past 41 years the daily newspaper of the trade furnishing the most thorough coverage of the important buyers of iron, steel and nonferrous metals and metal products. An effective advertising medium used by over 160 important sellers of ores, ferroalloys, iron, steel and nonferrous metals. Member of the Audit Bureau of Circulations.

AMERICAN ROLLING MILL COMPANY
Middletown, Ohio ***Booth F-31***

In attendance: G. F. Ahlbrandt, assistant vice president; J. P. Butterfield, manager; F. A. Tobitt, Jr., and John Owen, stainless steel sales department; Anson Hayes, director; Reed Kenyon, associate director; and B. F. Finkbone, products engineer of research laboratories; C. F. Feledy, W. A. Kuenzel and F. B. Dechant, sales engineers; R. A. Dadisman, manager, and R. M. Nelson, market development division; F. A. Tobitt, manager of Eastern sales department; A. M. Wortley, manager; and F. S. Campbell, Philadelphia office.

Exhibiting (in operation): The part that Armco special metal sheets are playing in defense preparations will be spotlighted. A complete air-raid and munitions shelter will be the focal point of the 60-foot display.
Visitors will see the shelter partly buried in a hill side and protected with sand bags. Inside will be bunks and ammunition. The entrance will be arranged so the exterior and interior may be inspected. The main section of the shelter is formed from rugged 7 gage Armco multi-plate corrugated sheets. End walls of the 14-foot span are out-flanged channel sections fabricated from 11 gage galvanized sheets. The shelter has an eight-foot rise.
At an information booth questions on uses, welding, finishing and forming of various metal sheets for defense jobs will be answered by engineers who will perform fabricating and finishing operations.
New fabricating data bulletins on such Armco specialty sheets as stainless steel, Paintgrip and Zincgrip will be offered at the booth. They cover welding, soldering, painting, drawing and forming.
Between demonstrations a series of Kodachrome slides will be shown to give spectators a complete picture of the finishing and fabricating of special sheets. The slides are synchronized with a running commentary by Peter Grant, well known newscaster.
Other sections of the booth will be devoted to photographs and sketches of ammunition dumps, larger air-raid shelters and embankment walls. A study of the qualities of Armco stress-resistant railroad wheels can be made from the test wheels on display. The use of spiral welded pipe for foundation piling also will be demonstrated.

Samples of Armco electro-polished stainless steel will illustrate the adaptability of the process to straight chrome stainless steels. A fender from a late model automobile will point out how a single sheet of Armco cold rolled steel can be drawn severely.

Panels of the background will show properties of Armco special-quality sheet metals. Formed articles used in defense work, such as porcelain enamel pitchers, high-tensile gun mountings and stainless steel exhaust collectors will be exhibited on a turntable.

All Armco divisions, including sheet and strip sales, spiral welded pipe, culverts, railroad sales and formed products, will be represented.

AMERICAN SOCIETY FOR METALS
Cleveland ***Booth 215***

AMERICAN STEEL CASTINGS COMPANY
Newark, N. J. ***Booth 298***

See Steel Founders' Society of America.

AMERICAN STEEL & WIRE COMPANY
Cleveland ***Booth, Stage***

See United States Steel Corporation.

AMERICAN WELDING SOCIETY
New York ***Booth H-43***

AMPCO METAL, INC.
Milwaukee, Wis. ***Booth F-50***

In attendance: R. W. Uecker, secretary-treasurer; J. D. Zaiser, assistant general manager; R. J. Thompson, district manager; A. H. Stodder, H. C. Haines, H. R. Gordon, R. S. Stover, district representatives; and C. E. Swift, welding engineer.

Exhibiting (in operation): Rough and machined parts made of Ampco Metal and special bronzes, many of which are made to Federal, Navy or Air Corps specifications. Sand and centrifugal castings, forged and extruded bar stock as used by the aircraft and machine tool industries and manufacturers of heavy machinery. A welding booth will demonstrate Ampco Trode, a coated aluminum bronze welding rod, developing physical properties not now obtainable in ordinary bronze rod.
Examples of various alloys produced for difficult industrial applications will be incorporated in the display.

ANDERSON & SONS
Westfield, Mass. ***Booth C-13***

ARCOS CORPORATION
Philadelphia ***Booth 12***

In attendance: R. D. Thomas, president; R. E. Carriat, secretary; H. N. Ewertz, sales manager; K. W. Ostrom, welding technician; R. D. Thomas, Jr., metallurgical engineer; T. H. Nelson, salesman; B. B. Ross, welding engineer; and E. C. Shook, salesman.

Exhibiting (in operation): A special dipping machine will be featured for the manufacture of stainless electrodes by the dipped process. This modern unit illustrates the refinements which have made this process capable of producing very high grade special electrodes in large quantities. In addition, there will be a display of samples illustrating the qualities of Arcos stainless, alloy and nonferrous weld metal, and welds made with them.

ARMSTRONG CORK COMPANY
Lancaster, Pa. ***Booth D-35***

ATLANTIC STEEL CASTINGS COMPANY
Chester, Pa. ***Booth 298***

See Steel Founders' Society of America.

AUDUBON WIRE CLOTH CORPORATION
Philadelphia ***Booth D-21***

AUTOMATIC TEMPERATURE CONTROL CO., INC.
Philadelphia ***Booth 31***

In attendance: G. H. Johanson, president; J. D. Andrews, sales manager; J. C. Whiddett, sales department; W. C. Bellis, New York representative; H. Wetter, Philadelphia representative; G. S. Frazee, Pittsburgh representative; G. Goodman, Baltimore representative; I. G. Johanson, engineering department; and R. H. Mecklenborg, exhibit manager.

Exhibiting (in operation): Type 4 valve operator for operating burners from one point. Has "developed torque" greater than other types of valve operators. Time-Temperature program controller for accurately governing the rate of heating and cooling. Reduces the amount of equipment ordinarily employed. Double Two-Position valve operator provides wide fuel valve swing for heating up and cooling periods and a much narrower throttling range for use when temperature is near the control point. Special "Unit Package" panel illustrating the application of our Time Control engineering service.
Series 2900 position indicator for remote indication of mechanical movement, liquid level and temperature. "Balancer" control system, utilizing series 1400 relays; with new refinements. Accessories added to series 2800 "Vernier-Set" timers including explosion proof cases, and cycle progress indication.
Series 1300 "Moto-Merco" relay used for obtaining an improved type of three-position control from a two-position pyrometer. Series 1500 mercury load relay used for handling heavy load currents from our time control contacts. Series 1900 resetting dial timer providing many load actions, indicaton of cycle progress, and external setting. Series 2100 dial timers employing reversible motor principle. Series 2200 dial timers employing reversible motor principle, external adjustment, cycle progress indication, and wide choice of dials. Series 2400 cam program timers providing the most in flexibility and contact arrangement. Series 2600 input controllers used for manual or automatic control of the input to electric furnaces and other electrical heating processes. Class 2703 open hearth reversal timer used for timing the firing of regenerative type furnaces. Provides also for program reversing of the various valves and dampers at the end of each period. Series 2800 "Vernier-Set" timers, flexible unit, small in size, wide choice of dials, vernier adjustment of setting. Series 4100 Repeat-Cycle timer provides easy adjustment of the total length of cycle and of the per cent of that cycle for which contact is to be either made or broken.
Type 1 valve operator replaces solenoid valves for many applications, bringing with it the advantages of low current consumption, long life and easy adjustment. For operation with slip stem valves. Type 2 valve operator for two-position control of slip stem or rotary stem valves. Type 3 valve operator is a heavy duty unit used for the operation of many valves from one assembly. Type 303 valve operator is a large, heavy duty unit, easily serviced, constructed for handling of large types of valves.

AUTOMOTIVE INDUSTRIES
Philadelphia ***Booth A-54***

In attendance: C. A. Musselman, president; J. S. Hildreth, vice president and manager auto division; Julian Chase, directing editor, auto division; G. C. Buzby, manager, direct mail and sales representative; E. W. Hevner, circulation manager, auto division; E. H. Miller, advertising manager, auto division; W. K. Toboldt, editor, Motor Age; G. T. Hook, editor, Commercial Car Journal; Henry Jennings, technical editor, Commercial Car Journal; Joseph Geschelin, Detroit technical editor, Automotive Industries; and M. C. Dittmann, sales representative.

Exhibiting: Automotive publications and services.

BABCOCK & WILCOX COMPANY
New York ***Booth 27***

In attendance: A. M. Kohler, general manager, refractories division; J. E. Brinckerhoff, sales manager, refractories division; J. D. McCullough, engineering

design, refractories division; J. W. Moffat, refractories division; C. L. Norton, research engineer; G. H. Frederick, Philadelphia district sales manager, refractories division; M. A. Kohler, Philadelphia sales office, refractories division; and C. H. Neighbors, manager, advertising division.

Exhibiting (in operation): By means of an interesting set of slides, B & W refractories will be shown, emphasizing the high degree to which the refractories have been mechanized and the tremendous strides which have been taken towards modernizing one of the World's oldest industries.

Views in the B & W research laboratories will show the equipment in use and some of the new products which are constantly being developed for future manufacture.

A series of panels and models will demonstrate some of the refractory constructions and designs.

A complete showing of B & W Refractories will be made including 5 insulating firebrick, 2 special firebrick, 7 mortars and plastics, and 2 insulating concrete mixes.

BAKER & COMPANY, INC.
Newark, N. J. ***Booth G-43***

In attendance: H. J. Russell and L. C. Burman.

Exhibiting (in operation): Platinum laboratory equipment; platinum and platinum clad chemical equipment; precious metal thermocouples and protection tubes; blowerless tool room laboratory and atmospheric furnaces; and Baker Brunjes platinum resistance coal ash analysis furnace.

BALDWIN LOCOMOTIVE WORKS
Philadelphia ***Booth E-6***

BALDWIN SOUTHWARK DIVISION, BALDWIN LOCOMOTIVE WORKS
Philadelphia ***Booth E-6***

BARRETT-CRAVENS COMPANY
Chicago ***Booth G-47***

BAUSCH & LOMB OPTICAL COMPANY
Rochester ***Booth F-46***

BENNETT INSURED STEEL TREATING COMPANY
Newark, N. J. ***Booth B-54***

BETHLEHEM STEEL COMPANY
Bethlehem, Pa. ***Booth D-6***

BIRDSBORO STEEL FOUNDRY & MACHINE CO.
Birdsboro, Pa. ***Booth 298***

See Steel Founders' Society of America.

BLACK & DECKER MANUFACTURING COMPANY
Towson, Md. ***Booth 44***

In attendance: Eric Federschmidt, manager, Philadelphia branch; Frank Cassidy and Ralph Herrick, salesmen; G. M. Buchanan, high cycle sales engineer; and J. F. Apsey, Jr., advertising manager.

Exhibiting (in operation): A complete display and demonstration of portable electric tools applicable to metal processing and finishing. This will include power assembly tools, such as screw drivers and nut runners, a complete line of abrasive tools including die grinders, portable grinders, sanders and buffers, as well as electric shears for cutting sheet metal, electric drills of various sizes and accessories to these various groups of processing equipment.

These tools will be demonstrated in both the Universal line for general production and maintenance use, and in the High Cycle line, a special group of production tools operating on 180 cycle current for constant-duty production service.

BLACK DRILL COMPANY
Cleveland ***Booth B-29***

In attendance: L. G. Black, president; F. G. Gepfert, director of sales; and J. R. Novotny, general superintendent.

Exhibiting (in operation): Hardsteel drills will be demonstrated on a drill press. Any person interested may drill carburized tool steel, high speed, high carbon-high chrome, and nitrided surfaces, oil and water-hardened tool steel, armor plate, and all the mill files. There, he may make his own hardness test, or have metal tested for him on a Rockwell tester, and by using the drill press with a Hardsteel drill, work any piece he desires.

Any person interested is invited to bring with him any piece of hardened metal which he may care to drill at the show, or to discuss drilling operations with the engineers in attendance.

BLAST FURNACE AND STEEL PLANT
Booth B-33

See Heat Treating and Forging.

BOTFIELD REFRACTORIES COMPANY
Philadelphia ***Booth A-16***

BRADLEY WASHFOUNTAIN COMPANY
Milwaukee ***Booth B-22***

In attendance: R. G. Owen, Alec Hicks and Arthur Hicks.

Exhibiting (in operation): Group washing equipment including Washfountains and **Multi-Stall Shower.** One of the former will be in actual operation, affording visitors to booth opportunity to wash their hands, as well as to see fixtures in use.

BRIDGEPORT BRASS COMPANY
Bridgeport, Conn. ***Booth H-38***

THE BRISTOL COMPANY
Waterbury, Conn. ***Booth 66***

In attendance: L. G. Beane, vice president and general sales manager; H. E. Beane, field sales manager; C. W. Bristol, chief engineer; F. W. Borchers, Philadelphia district manager; R. M. Walker, manager field engineering department; L. E. Mustard, Detroit district manager; F. J. Reynolds, New England district manager; C. Webber, New York district manager; and G. H. Gaites, Pittsburgh district manager.

Exhibiting (in operation): Control instruments for high and low temperatures in the heat treating of metals and other materials.

The Pyromaster—a round chart potentiometer controller with greatly simplified operating units, no continuously moving parts, resistant to plant vibration, and not requiring lubrication. Show as (1) an eleectric controller, using Bristol's Unitact system for closer control and to eliminate chattering at the control contacts; and (2) as an air operated controller equipped with Bristol's Free-Vane system of air control and providing wide throttling range and reset control adjustments.

A Pyromaster Time-Temperature Controller will be exhibited on a furnace to show the operation of this instrument in varying furnace temperature according to a timed schedule.

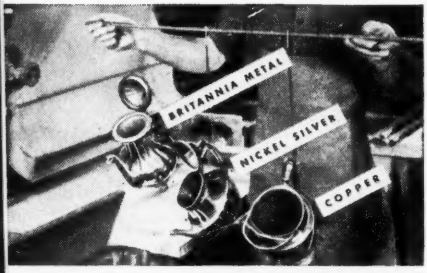
The Wide-Strip—a strip chart potentiometer controller with totally enclosed galvanometer, and pen and slide wire contact integral, which are among the features of these instruments contributing to fine performance.

The Electronic Controller—a recently developed pyrometer controller using a new electronic circuit. It operates without moving parts in the control circuit—

PENNSALT CLEANERS SPEED TH FI

...as America turns from co

AUTOMOBILE FENDERS are speedily, economically prepared for Bonderizing in a bath of a Pennsalt Cleaner.



THREE METALS . . . soon to be plated and become silverware . . . are cleaned fast and at low cost in a solution of one Pennsalt Cleaner.

REFRIGERATOR CABINETS made of sheet steel are swiftly cleaned, prior to enameling, in a Pennsalt Cleaner solution.

As America's peacetime production lines have become the battle lines for Defense, manufacturers of a thousand-and-one metals and metal products have turned to making munitions . . . going from coupes and sedans to combat cars and tanks almost overnight.

These manufacturers have metal cleaning problems that are just as hard to solve as ever . . . perhaps harder, because speed is so essential. But they've found that Pennsalt Cleaners are just as efficient in cleaning parts for battleships, warplanes, guns and shells as for refrigerators and radios. So, today, 91% of the output of Pennsalt Cleaners is being used for Defense!

Many manufacturers in many different industries use Pennsalt Cleaners to speed up their cleaning operations. They shorten their whole cleaning cycle, often eliminating precleaning and manual operations.

TH FINISHING OF MUNITIONS
...om coupes to combat cars!

They save labor and cut cleaning costs.

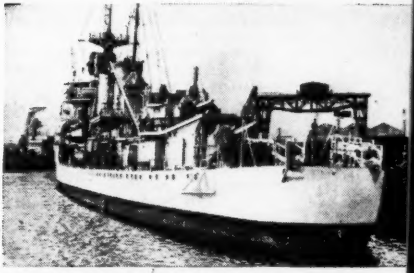
They use Pennsalt Cleaners to remove and prevent the redepositing of all kinds of dirt . . . grease, oil, rouge, emery dust, grit, carbon smut. They clean many metals and alloys, including carbon and alloy steels, stainless steel, zinc, copper, brass, bronze, nickel, nickel silver, Britannia metal and aluminum.

And leading manufacturers who work with metals will tell you that Pennsalt Cleaners give metals and metal parts . . . rolled, forged, stamped, drawn or cast . . . a thoroughly clean, satin-smooth finish prior to Bonderizing, Parkerizing, enameling, painting, galvanizing or plating.

We invite your inquiries. Our sales and technical staffs are at your service backed by adequate supplies of all Pennsalt Cleaners. Phone, wire or write our Pennsalt Cleaner Division, Dept. P.

STEEL PARTS FOR COMBAT CARS and tanks are cleaned faster in a Pennsalt Cleaner solution . . . with several shot blasting operations eliminated. Grease, dirt and paint are all removed by this cleaning prior to Parkerizing.

STEEL AND ZINC AIRPLANE PARTS are freed of oil and buffing compounds in a Pennsalt Cleaner solution before plating with hard chrome. Other steel airplane parts similarly cleaned before cadmium plating. The Pennsalt Cleaner solution also strips hard chrome from steel parts without etching them.



DESTROYERS, GUNS AND SHELLS have many metal parts which are speedily cleaned during processing, prior to protective coating, in solutions of various Pennsalt Cleaners.

PENNSYLVANIA SALT
MANUFACTURING COMPANY
Chemicals

1000 WIDENER BUILDING, PHILADELPHIA, PA.

New York • Chicago • St. Louis
Pittsburgh • Wyandotte • Tacoma

such as motors, depressor bars, toggle switches and open contacts.

BROWN INSTRUMENT COMPANY, DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR CO.
Philadelphia ***Booth 63***

In attendance: E. B. Evleth, vice president and general manager; L. M. Morley, vice president and general sales manager; K. R. Knoblauch, assistant general sales manager; J. R. Green, manager, steel division; J. E. MacConville; H. M. Schmitt, Philadelphia industrial manager; J. R. Simpson, Jr.; G. H. Larkin; L. J. Benson; A. Potts; O. B. Pyle; W. J. Brosch; R. Schlegel; and R. S. Ferguson.

Exhibiting (in operation): Indicating, recording and controlling instruments and accessory equipment used in the production and heat treating of both ferrous and nonferrous metals. Instruments for automatically controlling the temperature of electrically heated and oil or gas fired furnaces will be demonstrated in operation. These will include electrically and pneumatically operated thermometers for die casting machines, ovens, tempering tanks and other services up to 1200° F.—also electrically and pneumatically operated control potentiometers for use with thermocouples or radiation pyrometers for hardening, brazing and annealing furnaces or other services up to 3400° F. The following instruments will be featured:
The new Brown Continuous Balance Circular Chart Potentiometer instrument is a revolutionary addition to the Brown Line of temperature measuring equipment, employs a "continuous balance" unit for its operating principle. Built in modern design rectangular case for universal mounting, it harmonizes with the well-known line of Brown Rectangular Case instruments for measurement of temperature, pressure, flow and liquid level.
Brown Radiamatic Pyrometer which is convenient to operate where thermocouples are impractical. Is designed to operate under severe conditions of temperature and vibration. Consists essentially of a heat resisting lens, a compensator and a thermopile.
Brown Program Control Potentiometer Pyrometer is a model of the Wheatstone bridge potentiometer designed to control the rate of temperature rise and control of heat over a set period of time. All functions easily changed to suit new program or any part of program by moving marked dials graduated in degrees per hour in hours.
Brown Proportioning Control Potentiometer Pyrometer operates on the Wheatstone bridge principle, producing a control characteristic in which the position of the motor or motor valve is dependent upon the deviation of temperature from the control setting.
Brown Multiple-Recording Potentiometer Pyrometer is used to record from two to six temperatures on one chart, in multi-color numeral records.
Brown Thermometers and Pressure Gauges are for temperature and pressure recorders, indicators and controllers in modern, steamlined, rectangular cases. A scientifically controlled method of winding the spiral insures accurate calibration. Ample pen torque is provided without sacrificing speed of response.
Brown Protectoglo System will demonstrate a combustion safeguard of the utilization of the electrical conductivity of the flame itself giving positive protection against flame failure.

CHARLES BRUNING COMPANY, INC.
New York ***Booth A-22***

BRUSH DEVELOPMENT COMPANY
Cleveland ***Booth 26***

BRYANT HEATER COMPANY
Cleveland ***Booth Q***

BUDD INDUCTION HEATING, INC.
Detroit ***Booth F-22***

In attendance: H. E. Somes, director; and H. O. Mainzinger.
Exhibiting: Cylinder liners for pumps, Diesel engines and cylinders for aircraft engines, pipe such as is used for oil well casings, hubs for automobile wheels, and a variety of bore races that have been treated by the Budd induction process. All material has been processed to produce a hardened inside surface of predetermined depth. The important advantages of this process which produce a hardened interior surface by electrical induction are: 1. elimination of distortion; 2. elimination of excessive oxidation; 3. remarkably close adherence to metallurgical tolerances with respect to relative hardness, depth of hardened surface, concentricity of hardened surface; and 4. it is a heat treating process which can be established in the production line; its rate is extremely fast, and it does not require the removal of batches of finished parts to a separate department.

ADOLPH I. BUEHLER
Chicago ***Booth 30***

In attendance: A. I. Buehler, owner; G. W. Graves, metallurgist; and Erich Weidner, salesman.

Exhibiting (in operation): Cutters, grinders, polishers, mounting presses, microscopes, macro camera, hardness testers, titrator, carbonmeter, pH Meter for the metallurgical laboratory.

BURKAY COMPANY
Toledo, Ohio ***Booth P***

H. W. BUTTERWORTH & SONS COMPANY
Bethayres, Pa. ***Booth H-47***

In attendance: H. V. Witherington, manager foundry division; and E. G. Beck, manager of sales.

Exhibiting: Rough and finished castings.

CALITE TUNGSTEN CORPORATION
Union City, N. J. ***Booth G-54***

CAMBRIDGE WIRE CLOTH COMPANY
Cambridge, Md. ***Booth C-17***

CAMPBELL DIVISION, ANDREW C., AMERICAN CHAIN & CABLE COMPANY, INC.
Bridgeport, Conn. ***Booth A-27***

CANADIAN RADIUM & URANIUM CORPORATION
New York ***Booth C-28***

In attendance: Boris Pregel, president; A. J. Pregel, vice president; H. B. Kearney, sales manager (in charge); J. S. Harris, and Frank Hartman, representatives.

Exhibiting: Equipment used in connection with the making of radiographs with radium.

CARBOLOY COMPANY
Detroit ***Booth E-34***

CARBORUNDUM COMPANY
Niagara Falls, N. Y. ***Booth 236***

In attendance: Grinding Wheel Division—F. J. Tone, Jr.; S. F. Courter; B. H. Work; W. J. Griffith; A. H. Prey; H. J. Wills; C. L. Hall; H. L. Henszey; E. C. Maguire; and Paul Raguse. Refractory Division—F. W. Miller; J. G. Fritzinger; J. A. King; R. A. Barr; C. E. Hawke; and A. A. Turner. Globar Division—B. A. Bovee; K. E. Rogers; and C. E. Barba.

Exhibiting: Abrasive and refractory products.

CARNEGIE-ILLINOIS STEEL CORPORATION
Pittsburgh ***Booth, Stage***

See United States Steel Corporation.

For Defense and for Normal Industry

MANY FINISHING PROBLEMS HAVE BEEN SOLVED HERE!

Can we help you?

Out of the Parker Research Laboratories have come the solution to the most difficult finishing problems that have perplexed executives of some of America's giant industries.

Banishing rust from our automobiles, trucks, refrigerators, electrical equipment, office machines, and scores of other products is the result of their efforts. Now they are showing the way to effective protection of material for defense.

Showing the way to the conservation of strategic metals for defense purposes is the present most important purpose of this organization. Fitting Parker Processes to take the places of zinc, tin, cadmium and chromium — releasing these metals for vital defense needs — is the appointed task of the Parker Laboratories.

They are already successful in many industries. If you have a finishing problem, pass it on to this group of chemical engineers.

PARKER RUST PROOF COMPANY
2172 E. Milwaukee Ave., Detroit, Mich.

PARKERIZING
A finish and substantial protection from rust on bolts, screws and small mechanical parts.

BONDERIZING
A rust inhibiting paint base that bonds the finish to sheet metal surfaces.

PARCO LUBRIZING
A chemically produced coating for friction surfaces that retains oil and prevents metal to metal contact.

PARKER *Processes* **CONQUER RUST**
BONDERIZING · PARKERIZING · PARCO LUBRIZING

CARPENTER STEEL COMPANY
Reading, Pa. ***Booth 254***

In attendance: J. H. Parker, president; F. R. Palmer, vice president; B. H. De Long, chief metallurgist; G. V. Luerssen, metallurgist; P. B. Greenawald, metallurgical engineer; O. V. Greene, assistant metallurgist; W. H. Kemper, metallurgical department; George Brumbach, metallurgical department; S. M. Heck, metallurgical department; Walter Schlegel, metallurgical department; A. E. Keller, advertising manager; H. B. Gaylord; V. B. Fisher; N. C. Einwechter; W. O. Steele; Richard Evans; and Richard Calvert.

Exhibiting: The Carpenter "Magic Selector" will be featured. This actually shows, at the touch of a button, which tool steel will give best performance on a given job . . . thus offering a solution to industry's problem of conserving vital steels, and at the same time getting maximum performance out of present production facilities. If, for example, you have a tool in mind, you set the dial on the Selector to that particular type of tool. Then, by pressing a button, the "Magic Selector" automatically shows the proper steel for the tool under consideration.

Attention will also be given at the Carpenter booth to the urgent problem of training tool making apprentices. The use of the 315-page text book, "Tool Steel Simplified," will be demonstrated for this purpose.

CENTRAL SCREW COMPANY
Chicago ***Booth 220***

CHAPMAN VALVE MANUFACTURING COMPANY
Indian Orchard, Mass. ***Booth 204***

CHASE BRASS & COPPER COMPANY, INC.
Waterbury, Conn. ***Booth F-30***

In attendance: J. Vreeland; J. Babin; A. Moredock; F. Gallo; N. Mitchell; W. Evans; and D. K. Crampton.

Exhibiting (in operation): The main feature is to illustrate the tie-up of brass and copper products, as manufactured by Chase, with the defense industries. Also an actual demonstration of the welding of bronze, copper, and steel, illustrating all types of difficult welds. Samples of welded material will be on display, together with many of the vital products which we are making for defense work.

CHICAGO FLEXIBLE SHAFT COMPANY
Chicago ***Booth 74***

In attendance: J. H. Mills, sales manager; J. W. Wallarius, chief engineer; D. H. Gardner, sales engineer; J. W. Lazear, C. E. Noble, Benjamin Sampson, and Paul Sladky, sales representatives.

Exhibiting: Enlarged photographs of recent Stewart furnace installations in American and Canadian defense work. Ordnance and defense items in various stages of processing by Stewart industrial furnaces. New Stewart Wall Chart of 1941 S.A.E. Steel Specifications and suggested heat treatments, with tables of common tool die steel heat treatments, and other information invaluable to metallurgists, engineers, plant executives, purchasing agents, and heat treaters. Free copy suitable for framing will be mailed upon request.

Daily free drawing of Chicago Flexible Shaft Company's "Sunbeam" Shavemasters, Coffeemaster and Ironmaster.

CHILTON COMPANY
Booth A-54

See Automotive Industries.

CITIES SERVICE OIL COMPANY
New York ***Booth F-45***

CLEVELAND OVERALL COMPANY
Cleveland ***Booth B-16***

CLIMAX MOLYBDENUM COMPANY
New York ***Booth D-1***

In attendance: W. P. Woodside, vice president; C. M. Loeb, Jr., vice president; J. B. Thorpe, vice president; T. D. Parker; D. G. Carse; A. J. Herzig, chief metallurgist; V. A. Crosby; R. M. Parke; W. G. Patton; E. R. Young; G. O. Loeffler; J. D. Robb; P. M. Snyder; R. L. Wilson; H E. Hostetter; J. E. Wilson; T. E. Norman; and F. L. Woodside.

COFFING HOIST COMPANY
Danville, Ill. ***Booth C-51***

In attendance: E. J. Heinen, district sales manager.

Exhibiting (in operation): "Safety-Pull" Ratchet Lever Hoists, "Quik-Lift" electric hoists and spur gear chain hoists.

COLONIAL ALLOYS COMPANY
Philadelphia ***Booth G-11***

COLUMBIA STEEL COMPANY
San Francisco ***Booth, Stage***

See United States Steel Corporation.

CONTINENTAL INDUSTRIAL ENGINEERS, INC.
Chicago ***Booth 19***

CONTINENTAL MACHINES, INC.
Des Plaines, Ill. ***Booth B-46***

COPPERWELD STEEL COMPANY
Warren, Ohio ***Booth B-6***

In attendance: E. D. Kennedy, advertising manager; R. S. Clingan, Chicago, district sales manager; R. B. Kropf, field metallurgist; W. J. Buechling, chief metallurgist; N. L. Deuble, manager of sales; S. D. Williams, executive vice president; F. L. Lawrence, Detroit district sales manager; Paul Keller, Cleveland district sales manager; R. G. Willaman, New York district sales manager; and R. A. Karr, metallurgist.

Exhibiting (in operation): Special quality tool and electric furnace alloy steels. Stainless steels, corrosion and heat resisting steels, carbon tool steels, alloy tool steels, special and fine steels, Nitralloy steels, aircraft quality steels, and bearing quality steels.

CRAMP BRASS & IRON FOUNDRIES
Philadelphia ***Booth E-6***

See Baldwin Locomotive Works.

CRUCIBLE STEEL CASTING COMPANY
Lansdowne, Pa. ***Booth 298***

See Steel Founders' Society of America.

CYCLONE FENCE COMPANY
Waukegan, Ill. ***Booth, Stage***

See United States Steel Corporation.

DEEMER STEEL CASTING COMPANY
New Castle, Del. ***Booth 298***

See Steel Founders' Society of America.

A. P. DE SANNO & SON, INC.
Phoenixville, Pa. ***Booth C-30***

In attendance: Vincent Colajezzi and B. G. Hardy, sales and engineeirng department; C. H. Davis, special representative; S. G. Scheirer, engineering de-

Recipe FOR PLATING & ANODIZING RESULTS

UDYLITE

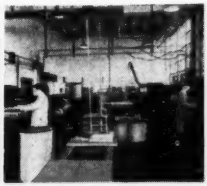
SUPPLIES & EQUIPMENT ● Udylite has a complete line of supplies and equipment, second to none in quality and efficient performance. Each product—each piece of equipment has passed the test of actual day after day service.

PLATING ENGINEERS & ELECTROCHEMISTS ● These men know metal finishing and they can help you plan a new installation or revise your present one for greater efficiency. They know, also, that you want accurate information, quickly.

UDYLITE SERVICE ENGINEERS ● Supervise the installation of all Udylite processes. They carefully check the equipment, instruct your operators and make sure that the job is right before turning it over to you.

Laboratory where efficiency of Udylite finishing processes is maintained by constant control.

Design and layout department where clients may obtain the advice of experienced metal finishing engineers.



Laboratory where all Udylite products are tested under actual plant conditions.

For prompt, dependable metal finishing information call on Udylite. No organization is better equipped to give you such accurate data gained from installing plating, polishing and anodizing departments in many of the leading manufacturing plants throughout the country. At Udylite you will find the answer to ALL your metal finishing needs with a big saving in time and confusion. Remember, you pay no more for Udylite dependability.

THE UDYLITE CORPORATION

1651 E. Grand Blvd., Detroit, Mich.

New York
60 E. 42nd Street

Chicago
1943 Walnut Street

Cleveland
3756 Carnegie Ave.

partment; N. A. Conway, Jr., advertising manager; F. B. Soulas and L. R. Burnes, district sales representatives.

Exhibiting (in operation): Radiac type "K" abrasive wheel cut-off machine for wet and dry cutting. Radiac type "M" abrasive wheel cut-off machine for dry cutting only. Specializing in new Por-OS-Way wheel for fast and cool cutting—feature—rapid removal of stock. Also, general line of grinding wheels up to 12 inches in diameter, and cut-off discs up to 18 inches in diameter. Also, abrasive mounted points and stones for air and pneumatic grinders.

DESPATCH OVEN COMPANY
Minneapolis, Minn. ***Booth 4***

DETROIT ELECTRIC FURNACE DIVISION, KUHLMAN ELECTRIC COMPANY
Bay City, Mich. ***Booth E-50***

In attendance: G. I. Wright, Philadelphia district agent; D. F. Potter, Jr., manager New York; D. W. Boyd, sales and service engineer; E. C. Woodruff, service engineer; R. P. Johnson, vice president, sales manager; and A. E. Rhoads, manager.

Exhibiting (in operation): Detroit Electric Furnace, conical shell design, types AA, 1,000 pounds; LFC, 350 pounds; GMS, 50 pounds; and N, 10 pounds; also automatic electrode control, meter panel; and Kuhlman Electric Furnace transformer.
Types AA, LFC, and GMS used for production melting of ferrous and non-ferrous alloys. Types GMS and N are laboratory or developmental furnaces.

DETROIT REX PRODUCTS COMPANY
Detroit ***Booth 282***

DETROIT TESTING MACHINE COMPANY
Detroit ***Booth 208***

DIAMOND IRON WORKS, INC.
Booth 7

See Mahr Manufacturing Company.

HARRY W. DIETERT COMPANY
Detroit ***Booth 258***

In attendance: H. W. Dietert, president; John Schuch and H. S. Read, spectographers; E. E. Woodliff, sales engineer; and Carl King, electrical engineer.

Exhibiting (in operation): A complete line of spectrographic equipment for analysis of metals. Rapid carbon and sulphur determinators will be in operation.
Sand testing equipment will be in operation for measuring moisture, permeability and strength.

HENRY DISSTON & SONS, INC.
Philadelphia ***Booth F-58***

DO-ALL EASTERN MACHINE COMPANY
New York ***Booth B-46***

DODGE-STEEL COMPANY
Philadelphia ***Booth 298***

See Steel Founders' Society of America.

THE DOW CHEMICAL COMPANY
Midland, Mich. ***Booth G-61***

In attendance: L. B. Grant, manager; O. E. Grant; G. W. DeKuiper; L. H. Stewart; J. C. H. Stearns; J. C. Mathes; and D. T. Wellman.

Exhibiting: Dowmetal magnesium alloys. Sand, permanent mold and die castings, sheet, strip and plate, extruded shapes, bars, rods and forgings, fabricated parts.

DREVER COMPANY
Philadelphia ***Booth H-22***

DRIVER-HARRIS COMPANY
Harrison, N. J. ***Booth 214***

In attendance: F. V. Lindsey, vice president and general sales manager; G. A. Lennox, assistant general sales manager; H. O. Hartdegen; W. E. Blythe, Detroit; A. J. Eckley, Detroit; L. V. Prior, Cleveland; K. H. Hobbie, Chicago; A. H. Krominga, New England representative; J. B. Shelby; and J. Sammon.

Exhibiting: Heat and corrosion resisting alloys.

EASTMAN KODAK COMPANY
Rochester, N. Y. ***Booth H-39***

In attendance: E. E. Smith; H. E. Seemann; and W. D. Kiehle.

Exhibiting: Industrial radiographs, and photographs in full color of factory processes. Industrial X-ray film and accessory equipment.

ECCO HIGH FREQUENCY CORPORATION
New York ***Booth C-38***

ECLIPSE FUEL ENGINEERING COMPANY
Rockford, Ill. ***Booth H***

In attendance: G. W. McKee, vice president; K. A. Scharbau, general manager; L. J. Strohmeyer and V. C. Leatherby, sales engineers; E. A. Stoner, shop superintendent; L. B. Maximon, Philadelphia; C. C. Carmody, Pittsburgh; O. L. Maddux, New York; L. G. Webber, Boston; H. H. Etter, Connecticut; E. H. Seelbach, Buffalo, and W. H. Kay, Cleveland, representatives.

Exhibiting (in operation): A gas-fired aluminum melting furnace of the stationary crucible type, for working with die casting set-ups. The furnace is equipped with McKee HE Entrainment burners which has the added feature of the "Torchette" which simplifies lighting. A McKee CS automatic air control valve will also be used.
Also, a gas-fired Eclipse bell type furnace. Suitable where bulky loads are to be heat treated. The load is piled on a base and the furnace is lifted by means of an overhead crane over the load. The furnace can be lifted from one base to another holding within itself a great quantity of heat. The furnace is fired by McKee Walltite blast burners which are all supplied by the McKee LP low pressure proportional mixer.
A McKee centrifugal pressure blower will furnish the air supply for these two furnaces.

EISLER ENGINEERING COMPANY, INC.
Newark, N. J. ***Booth A-50 and A-6***

See Resistance Welder Manufacturers Association.

In attendance: Charles Eisler, president; Charles Eisler, Jr., chief engineer; and Alex Klein, advertising manager.

Exhibiting: Various types of spot, butt and arc welders.

EL TALLER MECANICO MODERNO
Booth F-57

See Gardner Publications, Inc.

ELASTIC STOP NUT CORPORATION
Union, N. J. ***Booth G-31***

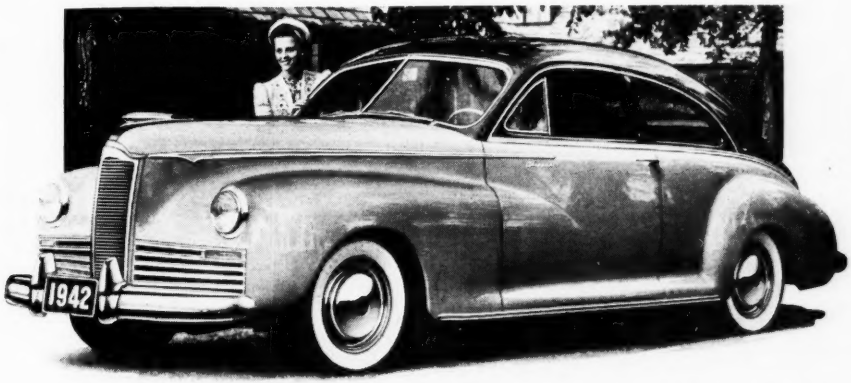
ELECTRO MANGANESE CORPORATION
Minneapolis, Minn. ***Booth 90***

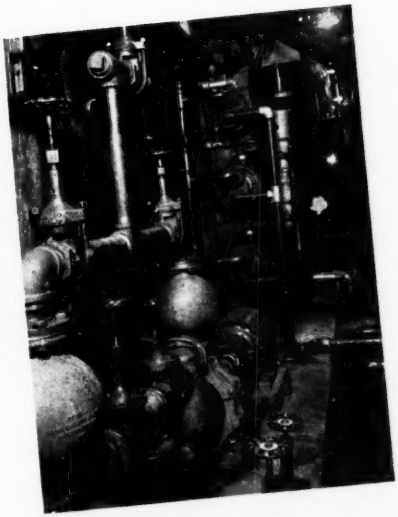
ELECTROLOY COMPANY, INC.
Bridgeport, Conn. ***Booth A-6***

See Resistance Welder Manufacturers Association.

"Skipper the Clipper," says Packard,

packing a lot of automobile into this model.





And they packed these Duriron Heating and Cooling Units and Duriron pumps into very little floor space.

The chrome liquor used for the brilliant trim on the *Clipper* is circulated through the units by two Duriron self-priming Pumps, with provision for cutting out one pump or the other. Steam is used for heating; water for cooling, with automatic control to maintain the liquor at the optimum temperature.

You, too, can clip off some of the uncertainties of plating—contamination . . . liquor too hot . . . or too cold . . . or too sluggish—by using Duriron Company equipment.

Write for Bulletin No. 1602-D now on the press.

The DURIRON COMPANY, Inc.
DAYTON, OHIO

EMPIRE STEEL CASTINGS, INC.
Reading, Pa. ***Booth 298***

See Steel Founders' Society of America.

EUTECTIC WELDING ALLOYS, INC.
New York ***Booth A-11***

In attendance: R. D. Wasserman.

Exhibiting (in operation): The new Castolin Eutectic Alloys for low temperature welding for all metals. These Alloys are particularly important for reclaiming at low temperature defective castings in cast iron, Monel, steel, nickel alloys, bronze and brass, aluminum, magnesium, as well as die castings. The Alloys bind at very low temperature without affecting the metal properties.

Also being shown in Castolin No. 16 for very low temperature brazing of tungsten carbide, for tipping tools.

EXPERT WELDING MACHINE COMPANY
Detroit ***Booth A-6***

See Resistance Welder Manufacturers Association.

FARRAND FOUNDRY CORPORATION
Bloomfield, N. J. ***Booth G-38***

In attendance: G. D. Smith, Jr., sales manager.

Exhibiting: Various size castings from patterns through rough finish.

FARREL-BIRMINGHAM COMPANY
Philadelphia ***Booth 298***

See Steel Founders' Society of Amerca.

FEDERAL MACHINE & WELDER COMPANY
Warren, Ohio ***Booth A-6***

See Resistance Welder Manufacturers Association.

FIESER-LUNDT, INC.
New York ***Booth B***

FIRTH-STERLING STEEL COMPANY
McKeesport, Pa. ***Booth 98***

In attendance: D. G. Clark, vice president; A. B. Corbin, sales manager; O. K. Parmiter, metallurgist; R. T. Riffle, advertising manager; G. W. Frick, Jr., manager Firthite division; M. F. Judkins, Firthite engineer A. R. Zapp, manager Firthaloy division; H. I. Moore, district manager, Hartford; O. T. Smith, district manager, Boston; A. E. Barker, district manager, New York; G. A. Jacobs, district manager, Detroit; E. T. Jackman, district manager, Chicago; and H. P. Jaeger, district manager, Cleveland.

Exhibiting: Firthite sintered carbide lathe tools; new designed Firthite tools now being used for turning gun barrels and artillery shells; milling cutters; end mills; boring tools; counterbores; drills; reamers; tipped Firthite gauges. Firthaloy sintered carbide dies and mandrels. High speed steel tools including shape hole drills, etc. High production dies of Cromovan.

FOXBORO COMPANY
Foxboro, Mass. ***Booth F-12***

In attendance: C. E. Sullivan, general sales manager and vice president; S. C. Horn, manager metal industry sales; J. Esherick, district manager, Philadelphia; A. H. Shafer, district manager, Pittsburgh; C. E. Hellenberg, district manager, Detroit; Harvey Lee, George Hammer, F. S. Walter, and H. A. Van Dyke, sales engineers.

Exhibiting (in operation): Those instruments of measurement and control which are most vital in increasing the metal industries' production of defense materials. The exhibit will emphasize the benefits gained when automatic control is employed, either to meet shortages of skilled operators or increased demands upon the production schedule.

Indicating, recording and automatic controlling pyrometers of various types will be demonstrated, as well as other Foxboro instruments widely used in heat treating processes. Recording and nonrecording controllers will represent the wide range of control system of both the pneumatic and electric types, which are available in various models to meet the requirements of any process or application.

FRANKLIN INSTITUTE
Philadelphia ***Booth***

GARDNER PUBLICATIONS, INC.
Cincinnati ***Booth F-57***

In attendance: D. G. Gardner, publisher; Howard Campbell, editor, Modern Machine Shop; F. W. Vogel, editor, Products Finishing; J. M. Krings, advertising manager; G. M. Fillmore, eastern manager; R. E. Ahrensdorf, eastern representative; G. E. Hay, central-western manager; and G. H. Meyers, western manager.

Exhibiting: Modern Machine Shop, Products Finishing, El Taller Mecanico Moderno, and Oficina Mecanica Moderna magazines.

GEHNRICH & GEHNRICH, INC.
Woodside, L. I., New York ***Booth M***

GENERAL ALLOYS COMPANY
Boston ***Booth 2***

In attendance: H. H. Harris, president; H. G. Chase, assistant to president; R. C. Sutton, director of engineering and metallurgy; L. M. Lindsey, director of engineering sales; R. D. Carver, general superintendent; W. J. Fitzpatrick, Philadelphia representative; H. W. Reynolds Cleveland representative; A. H. Valentine, Dayton representative; J. J. Donovan, western sales manager; T. E. Franks, Chicago sales representative; A. L. Grinnell, Detroit representative; G. O. Desautels, Indianapolis representative; Walter Gerlinger, Milwaukee representative; L. J. Edwards, New England representative; A. E. Painter, New York representative; R. E. Chew, vice president Ladd Equipment Co., Pittsburgh representative; and R. E. Lynd, Buffalo representative.

Exhibiting: Nickel-chromium heat and corrosion resistant alloys, Q-Alloys; carburizing and annealing containers; cyanide and lead pots, furnace hearths, roller rails, heat and acid resistant chain; cyanide dipping baskets, recuperators, miscellaneous furnace parts, parts for every type heat treating furnace—carburizing, annealing, normalizing, hardening, tempering, forging, spheroidizing; tubes and retorts, corrosion and abrasion resistant castings.

GENERAL ELECTRIC COMPANY
Schenectady, N. Y. ***Booth 230***

In attendance: C. I. MacGuffie; B. C. Tracey; C. L. Ipsen; and H. M. Webber.

Exhibiting (in operation): A model theatre fashioned after a large electric furnace will be featured. Seating 50 people, the theatre will be used for "House of Magic" presentations and a series of technical discussions. Operating demonstrations of equipment will be presented at each of the five booths located outside the theatre.

In the heating booth, a gas carburizing furnace and the new box-type furnace with its accompanying Drycolene-producing unit will be demonstrated. Visitors will see G-E's new thyratron control for motors in operation at the control booth, and also the standard line of G-E magnetic switches.

MASK DESIGNS
AND Save time
WITH
SCOTCH Masking TAPE
When the spray job calls for design, Scotch Masking Tape proves a fast, economical way to get color separation. You can follow sharp curves and contours and the thin, but strong, backing prevents build-up at the lap of color. Try Scotch Masking Tape on your next paint job.
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MINNESOTA MINING & MFG. COMPANY
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MINNESOTA
Canadian Manufacturers and Distributors CANADIAN-
DUREX ABRASIVES, LTD., 154 Pearl St., Toronto, Can.

At the motor booth, the Tri-Clad motor will be featured, with operating demonstrations of Formex wire. The welding booth will be a giant model of a welding transformer, in which will be demonstrated several types of welders. The G-E X-Ray Corp. will exhibit equipment used in X-raying metals.

GENERAL ELECTRIC X-RAY CORPORATION
Chicago ***Booth 230***

See General Electric Company.

GENERAL GAS LIGHT COMPANY
Kalamazoo, Mich. ***Booth T***

GENERAL STEEL CASTINGS CORPORATION
Eddystone, Pa. ***Booth 298***

See Steel Founders' Society of America.

GLOBAR DIVISION, CARBORUNDUM COMPANY
Niagara Falls, N. Y. ***Booth 236***

See Carborundum Company.

CLAUD S. GORDON COMPANY
Chicago ***Booth 208***

GROB BROTHERS
Grafton, Wis. ***Booth H-51***

See Charles R. Yerger Company.

GULF OIL CORPORATION
Philadelphia ***Booth G-36***

H & H RESEARCH COMPANY

HAMILTON MANUFACTURING COMPANY
Two Rivers, Wis. ***Booth G-30***

In attendance: R. W. Brunsman, manager, New York (in charge); H. R. Morris, manager, Rahway, N. J., warehouse; J. Embury, Eastern representative; W. A. Friedrich, Washington representative; and D. C. Dean, director, sales-drafting furniture division.

Exhibiting: Drafting tables and filing equipment.

HANDY & HARMAN
New York ***Booth C-40***

CHARLES HARDY, INC.
New York ***Booth G-13***

In attendance: Charles Hardy, president; R. L. Patterson, vice president; F. H. Mulligan, sales manager; J. B. Christie, in charge of research and development; G. D. Cremer and J. J. Cordiano, research and development laboratory; and S. V. D. Kilbourn, administration.

Exhibiting (in operation): Metal powders and products manufactured from metal powder, such as bearings, bushings, clutch facings, brake linings, magnets, hardware, tool parts, armament parts, abrasives.

HARNISCHFEGER CORPORATION
Milwaukee, Wis. ***Booth 82***

In attendance: L. M. Stout, district manager, Philadelphia; C. W. Daniels, district manager, New York; A. J. Dreyer, district manager, Pittsburgh; E. T. Slackford, advertising manager; B. Pratte, sales engineer; and several others.

Exhibiting (in operation): The many advantages of P & H-Hansen arc welders, welding electrodes, and P & H electric hoists. The welders will be mounted against an indirectly light background of grotesque figures of welder operators, to dramatize the salient features of these welding units.

One of the advantages brought out is the feature of paralleling several of the P & H-Hansen welding machines, making possible separate welding services of the full capacity of each machine or a combined output service of the two machines to meet the requirements for heavy duty welding.

An interesting arrangement of all available P & H welding electrodes with actual demonstrations using these rods and P & H-Hansen welders made within a welding booth for the inspection of all visitors.

Also on display will be several hoist units, namely the new P & H Zip-Lift, which is available in capacities from 250 to 1,000 pounds, and also the R-Type P & H Hevi-Lift hoist, available with either single or variable speed control and in capacities ranging from ¼ to 15 tons. These units will be mounted on an overhead I-Beam and wired for actual operation and will be set forward against a pictorial background of interesting photo enlargements of these units, as well as hevi-duty electric cranes in actual service throughout industry.

HARTFORD ELECTRIC STEEL CORPORATION
Hartford, Conn. ***Booth 298***

See Steel Founders' Society of America.

HAUCK MANUFACTURING COMPANY
Brooklyn ***Booth A-23***

In attendance: F. J. Schwenk, sales manager; A. J. Turpin, combustion engineer; A. F. Schumann and P. B. Clark, district representatives, Philadelphia.

Exhibiting (in operation): The new 1-inch Proportioning oil burner in operation on a small furnace with temperature and CO_2 recording instruments. Also featuring a heavy oil circulating system with complete line of Proportioning burners and micro cam oil regulating valves.

C. I. HAYES, INC.
Providence ***Booth C-34***

HEAT TREATING AND FORGING
Pittsburgh ***Booth B-33***

In attendance: D. N. Watkins, president; N. R. Moll, vice president, sales; Charles Longenecker, managing editor, vice president; W. N. Robinson, editor; H. Milton Reich, Western manager; T. B. Little, Eastern representative; and F. B. Yeager, field representative.

Exhibiting: Magazines—Heat Treating and Forging—Blast Furnace and Steel Plant.

HEVI-DUTY ELECTRIC COMPANY
Milwaukee, Wis. ***Booth E-30***

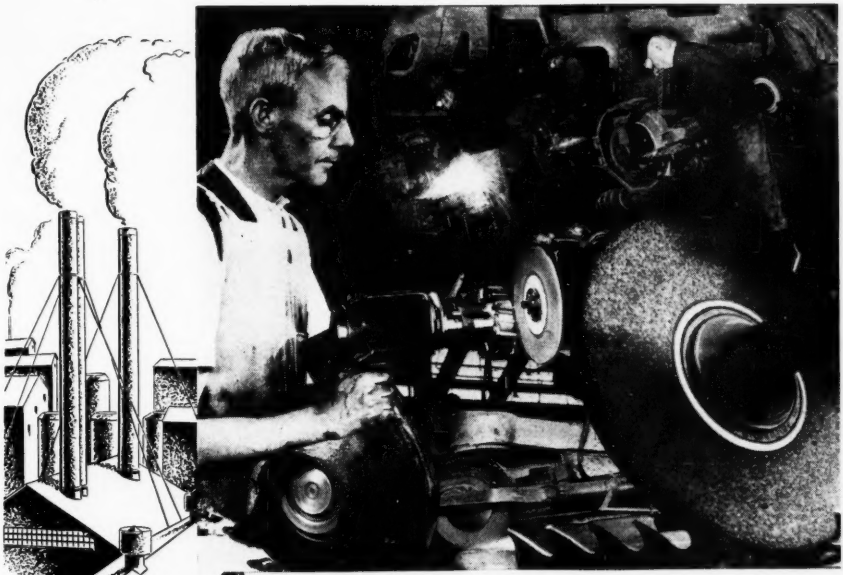
In attendance: G. A. Chutter, New York district manager; A. W. Frank and R. A. Urberg, New York representatives; A. H. Oberndorfer, advertising manager; E. L. Smalley, president; Elton Staples, Chicago district manager; James Ayling, Cleveland district manager.

Exhibiting: Laboratory equipment and Photos of industrial equipment.

HILD FLOOR MACHINE COMPANY
Chicago ***Booth H-59***

In attendance: F. C. Hild, president; F. N. Lyon, sales manager; Henry Metscher, manager New York branch; Milton Baker, Washington, D. C. representative; Henry Evans, New Jersey representative; Ira Thompson, Eastern New York State representative; and Russell Weiss, Philadelphia representative.

Exhibiting (in operation): Electric floor scrubbing machine for wet-scrubbing and dry-scrubbing grease, oil, and dirt from all types of factory floors. Industrial vacuums (portable) for general factory clean-up work—capable of picking up metal scrap, etc., in addition to regular dust, dirt. Also, may be used in conjunction with floor scrubbing machines to quickly and completely pick up dirty scrub-water, thus improving the quality of floor scrubbing and cutting down the man-power necessary for this job.



THROUGHOUT INDUSTRY . . . ABRASIVE WHEELS GIVE TOP PERFORMANCE

Grinding, cutting, finishing, polishing . . . a wide variety of materials from the many forms of steel to the hardest tungsten carbides . . . from ordinary cast iron to plastics, tile and stone . . . ABRASIVE COMPANY GRINDING WHEELS are truly vital tools to the industrial life of the Nation!

Their efficient cutting action enables them to give top performance on all grinding operations in industry from the finest precision work on metal-working production lines to coarse snagging in steel mills and foundries.

Our experienced force of abrasive engineers stands ready to be of service to you for the most efficient solution of grinding problems. May we send details?

PRECISION GRINDING
For tool and cutter, internal, cylindrical, centerless and surface grinding operations where superior surface finishes within microscopic tolerances must be maintained on a production basis.

ROUGH SNAGGING
For fast stock removal and long wheel life on floor stand, swing frame and portable electric, pneumatic and flexible shaft grinders in foundries, steel mills and other industrial plants.

ABRASIVE POLISHING
Borolon (aluminum oxide) abrasive grain specially processed for most efficient performance in polishing operations on the many forms of steel including stainless steel sheets and fabricated parts.

ABRASIVE COMPANY

Division of Simonds Saw and Steel Company, Tacony and Fraley Sts., Philadelphia, Pa.

ELECTRIC FURNACE PLANT ARVIDA, QUEBEC, CANADA • CHICAGO BRANCH 127 S. GREEN STREET

DISTRIBUTORS IN ALL PRINCIPAL CITIES

Manufacturers of Abrasive Grinding Wheels under the trade mark names BOROLON (aluminum oxide) and ELECTROLON (silicon carbide)

HITCHCOCK PUBLISHING COMPANY
Chicago ***Booth G-58***

In attendance: R. C. VanKampen, president and general manager; W. G. Paulson, editor; R. E. Stewart, assistant editor; R. J. Ferncase, advertising manager; W. E. Hoffman, Eastern representative; and D. B. Trott, Mid-Western representative.

Exhibiting: Copies of Machine Tool Blue Book will be distributed to executives of the metal working industry. Registrations will also be taken of those who desire to be placed on our mailing lists.

HOBART BROTHERS COMPANY
Troy, Ohio ***Booth D-39***

In attendance: E. A. Hobart, president; W. H. Hobart, vice president; O. H. Menke, production manager; W. J. Chaffee and E. K. Butterfield, welder sales; R. C. Bercaw, demonstrator; D. C. Anderson, factory distributor, Philadelphia; Walter Humphreys, Dave Humphreys, and Dave Little, sales.

Exhibiting (in operation): Hobart "Simplified" arc welders—both gasoline and electric drive models. Models to be featured are the "Aircraft," "Special" and Hobart's "Streamliner" gasoline engine driven models. Exhibit will be enhanced by mural photographs of defense arc welding activities. Visitors are invited to present and discuss their welding problems and requirements with production officials and engineers who will be in constant attendance at the booth.

W. J. HOLLIDAY & COMPANY
Hammond, Ind. ***Booth F-38***

HOLO-KROME SCREW CORPORATION
Hartford, Conn. ***Booth E-26***

CHARLES A. HONES, INC.
Baldwin, N. Y. ***Booth L***

E. F. HOUGHTON & COMPANY
Philadelphia ***Booth 60***

In attendance: G. W. Pressell, executive vice president; E. C. Barlow, assistant director sales; H. E. Sanson, sales manager, Eastern division; James McElgin, manager metal technical sales; R. M. Quintenz, technical sales department; C. H. Stonerod, R. W. Richmond, R. J. McCormack, J. A. Patch, S. T. Dolan, R. L. Wickes, G. W. Esau, S. D. Margerum, O. H. McClay, C. E. Kite, J. F. Weber, R. J. Swing, J. R. Clendenning, and F. J. Ramsey, sales representatives.

Exhibiting (in operation): Products which aid in the processing of metals for national defense purchases will be featured. Samples of finished products including machine guns, aircraft engines and propellers, shells, cartridge cases, small arms and medium calibre gun barrels, armor plate, and a wide variety of allied defense materials.
Prominent in the display will be parts blackened with Houghto-Black, the low temperature salt for protection and beautification of surfaces of low carbon steel.

Houghton's Rust Veto and Cosmoline will be featured; setting forth the various types of rust preventive coatings.

A cut-away aeroplane engine will be displayed to call attention to the aluminum and magnesium castings made with the aid of Houghton's Hy-Ten Core Oils, as well as to the fine machining done with the aid of Houghton's straight and soluble cutting oils.
Hot forging agents for shell manufacturing, solid liquid carburizers, drawing compounds, lubricants and leather packings will all be included.

HUNT SPILLER MANUFACTURING COMPANY
Boston ***Booth 298***

See Steel Founders' Society of America.

ILLINOIS TESTING LABORATORIES, INC.
Chicago ***Booth 76***

In attendance: J. A. Obermaier, president; M. D. Pugh, sales manager; and J. H. Torrey, representative.

Exhibiting: "Alnor" indicating pyrometers, resistance thermometers, controllers, and the direct reading air velocity meter.

INDEPENDENT PNEUMATIC TOOL COMPANY
Chicago ***Booth C-21***

In attendance: J. A. Hill, Philadelphia district manager; N. C. Hurley, Jr., vice president; W. A. Nugent, vice president; J. B. Dempsey; V. G. Turner; E. Hammett; E. R. Wyler, New York district manager; C. N. Kirchner, advertising manager; F. H. Charbono; E. R. Gee; Lewis Abbott; and W. D. Trainor.

Exhibiting (in operation): "Thor" portable electric drills—capacities from ¼ inch up to 1¼ inches. Portable electric screwdrivers portable electric nut setters; portable electric sanders; portable electric grinders; portable electric saws; portable electric hammers; and portable electric nibblers.

INDUCTION HEATING CORPORATION
New York ***Booth G-26***

In attendance: E. S. Goodridge, president; Paul Dravneek, field engineer; and William Crofton, sales manager.

Exhibiting (in operation): A high-frequency induction generator with dimensions of 36 x 36 x 59 inches high and equipment.

INDUSTRIAL HEATING
Pittsburgh ***Booth B-50***

See National Industrial Publishing Company.

INDUSTRIAL PUBLISHING COMPANY
Cleveland ***Booth A-26***

In attendance: I. B. Hexter, president; and L. P. Aurbach, vice president.

Exhibiting: Description and illustrations of advance in the use of welding in fabrication, production, and repair.

INDUSTRY & WELDING
Booth A-26

See Industrial Publishing Company.

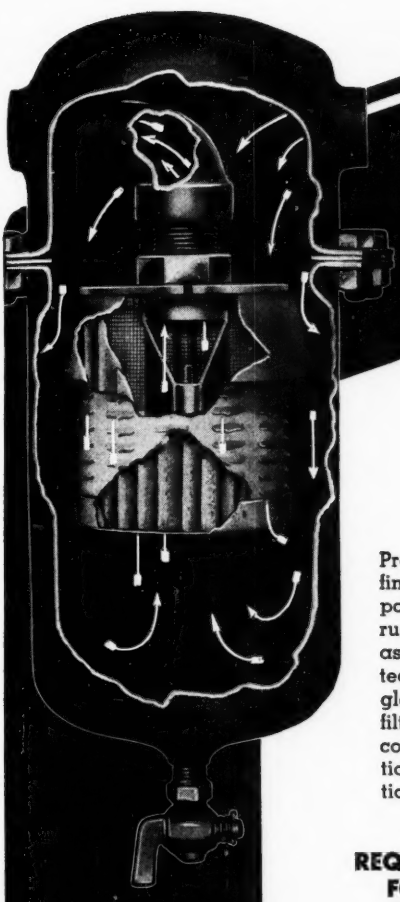
INGERSOLL STEEL & DISC DIVISION,
BORG-WARNER CORPORATION
New Castle, Ind. ***Booth C-26***

INTERNATIONAL NICKEL COMPANY
New York ***Booth D-26***

THE IRON AGE
New York ***Booth 296***

In attendance: J. H. Van Deventer, president and editor; C. S. Baur, vice president and general manager; Emerson Findley; Robert E. Blair; B. L. Herman; H. K. Hottenstein; H. E. Leonard; Peirce Lewis; C. H. Ober; W. B. Robinson; W. J. Fitzgerald; D. C. Warren; O. L. Johnson; B. H. Hayes; R. E. Baur; C. N. Baur; A. H. Dix; T. W. Lippert; W. A. Phair; F. J. Oliver; and T. C. Campbell.

Exhibiting: Copies of The Iron Age and publication data will be available.



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Protectomotor Filters for air lines used in finishing operations positively prevent the passage of water, oil, pipe scale, dirt, rust, and all other foreign matter. Installed as near to point-of-use as practical, Protectomotors often save their cost in a single month. Exclusive features increase filtering efficiency, lower maintenance costs. Model CPH (for horizontal installation) shown; Models for vertical installation also available.

REQUEST CATALOG AND "DATA FORM" FOR FREE ANALYSIS OF FILTER REQUIREMENTS

STAYNEW FILTER CORP.
"Air Filter Headquarters"
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Filters for:
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ENGINE
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LINES

PROTECTOMOTOR
REG. U.S. PAT. OFF.
99 9/10 Per Cent EFFICIENT
AIR FILTERS

JACKSON BUFF COMPANY
Long Island City, N. Y. ***Booth H-6***

JESSOP STEEL COMPANY
Washington, Pa. ***Booth 13***

In attendance: R. E. Emery, president; F. T. H. Youngman, vice president and treasurer; T. W. Pennington, sales manager; T. S. Fitch, manager composite steel division; and H. E. Doughty, Philadelphia representative.

Exhibiting (in operation): The theme of the exhibit will be "Substitutes for Strategic Materials." The feature will be an agitator in operation, made from Jessop's "Silver-Ply" stainless clad steel. Stainless clad steels conserve our vital nickel and chromium supply because the average sheet or plat contains 20% stainless steel inseparably united to a mild steel backing; therefore, one-fifth less nickel and chromium is used with complete protection.
Also, typical tools made from "Mogul" molybdenum type high speed steels. "Mogul" utilizes only 1.30 to 1.80% tungsten, offering great savings in tungsten as compared to 18-4-1 high speed steel.
Also various finishes supplied on stainless steel; and the welding of straight chrome stainless clad steels. A final exhibit will dramatize how Jessop Steels enter into National Defense.

JOHNS-MANVILLE SALES CORPORATION
New York ***Booth H-12***

JONES & LAUGHLIN STEEL CORPORATION
Pittsburgh ***Booth 216***

KELLEY-KOETT MANUFACTURING COMPANY
Chicago ***Booth C-57***

C. M. KEMP MANUFACTURING COMPANY
Baltimore

In attendance: E. B. Dunkak, vice president and sales manager; R. S. Van Note, assistant sales manager; William Hunt, development engineer; E. W. Abrahamson, New York manager; W. H. Gibb, Philadelphia manager; and W. J. Traxl, Connecticut manager.

Exhibiting: Items essential to national defense processed with gas fuel through the medium of the Industrial carburetor.

THE KENT COMPANY, INC.
Rome, N. Y. ***Booth C-49***

In attendance: M. G. Steele, factory manager; J. E. Heath, Paul Young, and Richard Bauchmoyer, salesmen; E. P. Wittschiebe, manager, New York office; Don Smith, salesman; G. W. Blanchard, manager, Washington office; P. V. Hugues, manager, Philadelphia office; and P. T. Hughes, salesman.

Exhibiting (in operation): The Kent Electric Mopper, our recent development for speeding up scrubbing operations. This machine picks up water used in scrubbing, by vacuum, thus contributing to the National Defense program by saving time and labor in maintenance programs. This is a multi-purpose machine: by simply removing the water separating tank and substituting a dust tank, the Mopper becomes a Kent Suction Commercial Model vacuum cleaner, which will also be on display. This small powerful unit reduces cleaning cost and time by effectively and speedily removing dirt and dust.
The Model C15 Kent floor machine will also be shown. This is used for wet scrubbing, in addition to sanding, waxing, polishing, and buffing. The Model D20, used for dry scrubbing, will also be on display.

ANDREW KING
Narberth, Pa. ***Booth B-31***

KROUSE TESTING MACHINE COMPANY
Columbus, Ohio ***Booth 212***

KUHLMAN ELECTRIC COMPANY
Bay City, Mich. ***Booth E-50***

See Detroit Electric Furnace Division.

LATROBE ELECTRIC STEEL COMPANY
Latrobe, Pa. ***Booth 15***

In attendance: A. E. Evans, manager Philadelphia branch.

LEBANON STEEL FOUNDRY
Lebanon, Pa. ***Booth 298***

See Steel Founders' Society of America.

LEEDS & NORTHRUP COMPANY
Philadelphia ***Booth 20***

LEPEL HIGH FREQUENCY LABORATORIES, INC.
New York ***Booth 229***

LEWIS MACHINE COMPANY
Cleveland ***Booth C-58***

L'HOMMEDIEU & SONS COMPANY, CHAS. F.
Chicago ***Booth E-44***

LINCOLN ELECTRIC COMPANY
Cleveland ***Booth 40***

In attendance: A. F. Davis and C. M. Taylor, vice presidents; E. W. P. Smith, consulting engineer; J. R. Morrill, assistant to the vice president; G. R. Johnson and G. N. Bull, district managers of Philadelphia and New York; L. J. Cogan, Jr., W. Sivyer, H. H. Stahl, W. D. Wood, Jr., and E. E. Goehringer, welding engineers.

Exhibiting (in operation): The exhibit will emphasize the importance of welding in National Defense, putting particular emphasis upon the arc welding of aircraft and ships. Actual demonstrations will show the arc welding of aircraft tubing and tubular parts, together with the welding of the various joints commonly used in ship construction. There will also be displayed for the first time at any national show important new developments in arc welding.
The exhibit of new welding machines will include: the "Aircraft" arc welder, developed expressly for use in manufacture of planes; the "Shield-Arc Jr.," a 200-ampere gasoline engine driven unit of especially light weight, small size and low cost for its capacity; and the latest improved type "Shield-Arc S.A.E.," containing many important features including a new control box of advanced design and construction, also a shortened and widened base for greatly increased stability.
Featured in the exhibit of 39 different arc welding electrodes, which collectively permit welding of every metal used to any extent for industrial work, will be two special rods for aircraft work. These are: "Planeweld No. 1" for welding airplane parts, .120-inch thickness and up, of chrome molybdenum steel, giving welds having physical properties similar to S.A.E. 4130 and X-4130; and "Planeweld No. 2" for welding light gauges of airplane tubing in chrome molybdenum steel, producing welds having physical properties also similar to S.A.E. 4130 and X-4130 steels.

LINDBERG ENGINEERING COMPANY
Chicago ***Booth 68***

A WAY TO MEET TODAY'S COATING METAL SHORTAGE

Paint -- properly baked -- is the only sure substitute. This baking can be done economically in Morrison ovens.

THOSE who have investigated the problem of how to replace galvanizing and other metallic surface coatings have arrived at the single answer of paint, owing chiefly to its present and future availability. But, paint can become an acceptable substitute only when applied under proper conditions, which necessitates baking.

Based upon many years of experience and hundreds of successful paint-baking oven installations, the Morrison Engineering Corporation offers you these answers to your present requirements: (1) Moderate price of ovens due to standardization of units. (2) Prompt delivery because of this standard manufacture, plus sufficient raw materials obtainable for oven construction. (3) Use of foresight in oven recommendations so that they will have a future productive use when coating metals are again available. (4) Sound advice on the difficult problem of material handling. (5) Precision control of temperature and atmosphere, and proper ventilation, which are necessities in good paint-baking. (6) High economy of fuel—oil or gas—and small space in proportion to production.

We are prepared to give you the prompt service and intelligent cooperation which the present situation demands, plus the element of wide and successful paint-baking experience which means so much when time and production are at stake. We urge that you get in touch with us immediately.

MORRISON ENGINEERED

MORRISON ENGINEERING CORP.

5005 EUCLID AVE. CLEVELAND. OHIO

MAAS AND WALDSTEIN COMPANY
Newark, N. J. ***Booth A-15***

MAC DERMID, INC.
Waterbury, Conn. ***Booth G-46***

MACHINE TOOL BLUE BOOK
Booth G-58

See Hitchcock Publishing Company.

MACHINERY
New York ***Booth 23***

MACHINERY MANUFACTURING COMPANY
Vernon, Los Angeles, Calif. ***Booth G-42***

MACKLIN COMPANY
Jackson, Mich. ***Booth 274***

MAGNAFLUX CORPORATION
Chicago ***Booth A-30***

MAGNETIC ANALYSIS CORPORATION
Long Island City, N. Y. ***Booth A-12***

MAHR MANUFACTURING COMPANY, DIVISION OF DIAMOND IRON WORKS, INC.
Minneapolis, Minn. ***Booth 7***

In attendance: L. J. Reay, president; W. G. Barstow, vice president; G. C. Winther, chief engineer; A. J. Nordenson and R. M. Hortvet, sales engineers; C. W. Rudolph, sales representative, Chicago; D. R. Grandy, sales representative, Cleveland; and Joseph Sodoma, sales representative, Newark.

Exhibiting (in operation): Large photographs of recent furnace installations. Literature describing in detail the various units.
Feature of exhibit will be operating model of a car type air draw furnace showing method of circulation in the heating chamber.

MALLEABLE IRON FITTINGS COMPANY
Branford, Conn. ***Booth 298***

See Steel Founders' Society of America.

P. R. MALLORY & COMPANY, INC.
Indianapolis, Ind. ***Booth 202 and A-6***

See Resistance Welder Manufacturers Association.
In attendance: J. A. Weiger, vice president, metallurgical division; J. D. Tebben, sales manager, metallurgical division; R. H. Imes, assistant sales manager, metallurgical division; R. F. Hensel, metallurgical consultant; A. J. Marino, Eastern division sales manager; E. F. Allison, Cleveland-Pittsburgh division sales manager; William Hayes, Detroit division sales manager; R. Barry, W. Bullock, G. R. Day, A. R. Gaus, W. G. Fetter, sales department; and P. N. Cook, advertising department.

Exhibiting: A complete exhibit of parts made from Mallory nonferrous alloys, including all sizes and types of spot welding tips, seam welding wheels, flash, butt, and projection welding dies, water cooled holders, and many miscellaneous products, such as flat springs, backings, bushings and bearings. A complete showing of Mallory electrical contacts of tungsten, silver, molybdenum, Elkonite, and special alloys for every type of service. Circuit breakers and other apparatus showing Mallory contacts in use will be featured.

MANGANESE STEEL FORGE COMPANY
Philadelphia ***Booth D-21***

See Audubon Wire Cloth Corporation.

MANHATTAN RUBBER MANUFACTURING DIVISION OF RAYBESTOS-MANHATTAN, INC.
Passaic, N. J. ***Booth B-13***

MARBURG BROTHERS, INC.
New York ***Booth 262***

In attendance: L. C. Marburg, secretary and treasurer, Marburg Brothers; Richard Krause and O. C. Mueller, sales engineers, Marburg Brothers; R. F. Moore, president, Moore Special Tool Company, Bridgeport, Conn.; J. R. Moore, manager, Moore Jig Borer Division, Moore Special Tool Company; and John Rice, demonstrator.

Exhibiting (in operation): Moore precision jig borer; Moore precision jig grinder; Holland HS vertical milling machine, with swivel head; Duplex die and punch filing machine; Lacey die set machine; and Berger hand tapper.

THE MATCHLESS METAL POLISH COMPANY
Chicago ***Booth G-34***

In attendance: H. S. Kelshaw, division manager; J. W. Varick, field engineer; W. H. Torrance and W. D. Mildern, sales department.

Exhibiting: Nonferrous metal compositions; Matchless greaseless composition for cutting down; Tampico and wire brushes.
Buffing compositions for use on the following materials, brass, copper, aluminum, stainless steel, zinc die castings, lead die castings, bronze, plastics, rubber, celluloid, wood, and plated ware.

MAURATH, INC.
Cleveland ***Booth D-31***

McGRAW-HILL PUBLISHING COMPANY
New York ***Booth 3***

See American Machinist.

McKAY COMPANY
Pittsburgh ***Booth E-38***

McKENNA METALS COMPANY
Latrobe, Pa. ***Booth D-55***

In attendance: Philip M. McKenna, senior partner; W. L. Kennicott, assistant manager; Walter Greenleaf, Western Pennsylvania district representative; R. B. Weeks, Chicago district representative; J. A. Deakin, New York district representative; John Roney, Detroit district representative; G. G. Thompson, Illinois district representative; C. M. Wheelock, Wisconsin district representative; A. M. Kebe, Ohio district representative; P. A. Patterson, Philadelphia district representative; George Raible, Cincinnati district representative; E. M. Kimball, Connecticut district representative; B. E. Middleton, upper New York State representative; and John Wilcox, Herb Braun, Joe Gabrig, and J. Milnor Roberts, sales representatives.

Exhibiting: Standard, semi-standard and special Kennametal steel cutting carbide tools, blanks, and wear resisting parts. Also typical work pieces which have been machined with Kennametal tools in various plants throughout the country, with special emphasis on parts for national defense work.
Of special interest will be the announcement and exhibition of the new round shank Kennametal boring tools, which have been added to the list of standard styles.
The Kennametal Catalogue and Tool Manual No. 42 will be released at the time of the Show. This catalogue gives, in addition to description and prices, recommended shop practice in machining and grinding with typical examples and photographs of work being done.

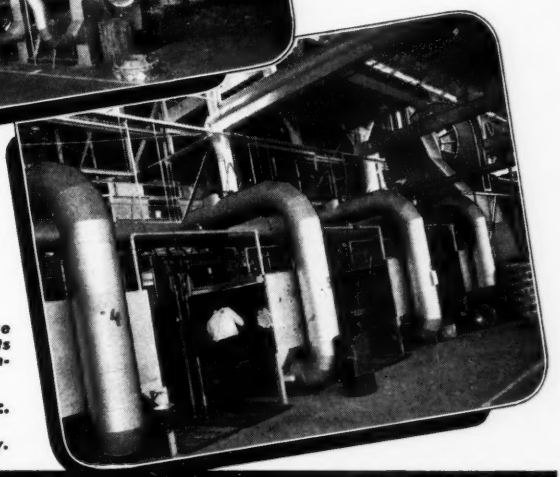
MEARS-KANE-OFELDT, INC.
Philadelphia ***Booth S***

ROTO-CLONES assure

Complete dust control at the

WRIGHT AERONAUTICAL CORPORATION

Objectionable dust caused by abrasive cleaning, grinding, and casting finishing is collected in the new Wright Magnesium Foundry by six Type W Roto-Clones exhausting 103,000 c.f.m. Overhead exhaust ducts carry collected material to the Roto-Clones which combine in a single compact unit-exhauster, dust collector, and storage hopper.



The constant exhaust volume and use of water sprays in the Type W Roto-Clone assure rapid removal of dust generated by grinders, band saws, and at cleaning benches where castings are finished.

●

Write for complete descriptive bulletins on the Roto-Clone and its applications to all abrasive cleaning dust problems.

AMERICAN AIR FILTER CO., Inc.
Incorporated
243 Central Ave. Louisville, Ky.

ROTO-CLONE *Dust Control System*

METAL FINISHING
Booth B-56

See Metal Industry Publishing Company.

METAL INDUSTRY PUBLISHING COMPANY
New York **Booth B-56**

In attendance: T. A. Trumbour, business manager; W. R. Meyer, editor; P. H. Langdon, assistant editor; and J. T. Wiarda, advertising manager.

Exhibiting: Copies of Metal Finishing; Plating and Finishing Guidebook; and Casting Manual for Non Ferrous Metals.

METAL PROGRESS
Cleveland **Booth 215**

See American Society for Metals.

METAL & THERMIT CORPORATION
New York **Booth F-26**

In attendance: J. B. Tinnon, sales manager; C. D. Young, Chicago district manager; H. T. Thompson, Pittsburgh district manager; C. D. Cooper, E. J. Knapp, and John Plaskin, welding experts; M. L. Smith, advertising manager; L. T. Work, director of research; O. T. Barnett, test engineer; D. L. Mathias, research engineer; and R. L. Browne, district manager.

Exhibiting: The complete Murex line, including seven different electrodes for arc welding of mild steel, as well as specially developed rods for welding various low-alloy, high-strength steels, for building up and hard surfacing worn parts and for a number of other applications will be displayed and demonstrated. In addition, the Thermit welding process for repair and fabrication of heavy parts will be featured and sample Thermit welds will be exhibited.

METALS & ALLOYS
New York **Booth A-38**

METLAB COMPANY
Philadelphia **Booth 39**

MIDVALE COMPANY
Philadelphia **Booth E-6**

In attendance: Stuart Hazlewood; H. H. Ziesing; Thomas Rutherford; William Edger; Truxton Brodhead; Homer Lackey; Scott Deemer; Robert Bird; Harvey Garrett; Frank Sleath; and Walter Smyth.

Exhibiting: Small weldless rings; hardened and ground rolls for cold rolling; extrusion liners for the manufacture of nonferrous shapes; heat and corrosion resisting castings; and large photographs of plant operations.

MILBURN COMPANY
Detroit **Booth H-37**

In attendance: G. M. Cole and D. L. Green, factory representatives; and J. A. Stifter, president.

Exhibiting (in operation): Exhibit of materials for industrial skin protection used for prevention of industrial skin irritations caused by toxic chemicals. Also material for protection of precision finished metals from corrosion caused by hand perspiration.

A. MILNE & COMPANY
New York **Booth H-31**

MINNEAPOLIS-HONEYWELL REGULATOR CO.
Booth 63

See Brown Instrument Company.

MODERN MACHINE SHOP
Booth F-57

See Gardner Publications, Inc.

MOLYBDENUM CORPORATION OF AMERICA
Pittsburgh **Booth E-42**

In attendance: Marx Hirsch, president; Van Rensselaer Lansingh, vice president; E. A. Lucas, vice president in charge of operations; W. H. Phillips, vice president in charge of sales; N. F. Tisdale, metallurgical engineer; and Earl Steward, Western district sales manager.

Exhibiting: Alloys and chemicals and molybdenum, tungsten and boron.

D. A. MOREINIS
New York **Booth B-46**

See Do-All Eastern Machine Company.

MORSE MAGNETO CLOCK COMPANY
New York **Booth B-35**

MOTCH & MERRYWEATHER MACHINERY CO.
Cleveland **Booth F-41**

MULTI-HYDROMATIC WELDING COMPANY
Detroit **Booth A-6**

See Resistance Welder Manufacturers Association.

NATIONAL COPPER PAINT CORPORATION
Chicago **Booth B-37**

NATIONAL ELECTRIC WELDING MACHINE CO.
Bay City, Mich. **Booth A-6**

See Resistnace Welders Manufacturers Association.

NATIONAL INDUSTRIAL PUBLISHING COMPANY
Pittsburgh **Booth B-50**

NATIONAL MACHINE WORKS
Chicago **Booth N**

NATIONAL TIME & SIGNAL CORPORATION
Detroit **Booth B-63**

NATIONAL TUBE COMPANY
Pittsburgh **Booth, Stage**

See United States Steel Corporation.

NICHOLSON FILE COMPANY
Providence, R. I. **Booth F-42**

NORTON COMPANY
Worcester, Mass. **Booth 290**

In attendance: W. R. Moore, general sales manager; W. T. Montague, assistant vice president; G. A. Park, Eastern sales manager; R. Kirkpatrick, sales manager, refractories division; A. G. Green, chief sales engineer; V. H. Ericson, sales engineering department; W. J. Bell; H. C. Steele; F. E. Leiby; C. W. Jinnette; A. Seymour, district manager, Philadelphia; A. W. Gough; J. D. Laughrey; W. A. McCune, Jr.; and C. M. Nyden.

OAKITE PRODUCTS, INC.
New York **Booth 226**

OFICINA MECANICA MODERNA
Booth F-57

See Gardner Publications, Inc.

OHIO CARBON COMPANY
Cleveland **Booth F-39**

OHIO CRANKSHAFT COMPANY
Cleveland **Booth 264**

Will you permit an expert to give your product the "once over lightly"....?

In these times of turmoil don't overlook the fact that finishing techniques are changing almost as rapidly as geography. Yesterday's perfect finish may have whiskers today . . . in which case, it won't be long before that ol' dictator, Competition, cracks down. A check-up does no harm . . . incurs no obligation . . . may cut your finishing time, reduce your finishing costs and enhance the salability of your product. Address your inquiry to Department J.

THE STANLEY CHEMICAL CO.

EAST BERLIN CONNECTICUT

Lacquers · Enamels · Synthetics · Japans

A SUBSIDIARY OF THE STANLEY WORKS, NEW BRITAIN, CONN.

THE OHIO SEAMLESS TUBE COMPANY
Shelby, Ohio ***Booth A-7***

In attendance: W. C. Connelly, president; A. Waines, Jr., manager of sales; R. A. Campbell, assistant manager of sales; M. W. Freese, advertising and sales promotion manager; O. L. Long, Philadelphia district sales manager; and P. L. Fair, district sales representative.

Exhibiting (in operation): Seamless and electric welded steel tubing.

THE OHIO STEEL FOUNDRY COMPANY
Springfield, Ohio ***Booth 22***

In attendance: T. H. Harvey, vice president; C. E. Malley, sales manager; F. J. Blaney, plant superintendent; D. W. Talbott, assistant plant superintendent; I. D. Cline, advertising manager; F. D. Rice, Philadelphia sales representative; and E. L. Malone, New York sales representative.

Exhibiting: Fahrite heat and corrosion resisting alloys. Literature and catalogue available.

TINIUS OLSEN TESTING MACHINE COMPANY
Philadelphia ***Booth 277***

In attendance: B. L. Lewis; G. C. Lawrie; E. Jacobsen; E. M. Redstreake; T. L. Richards; T. Y. Olsen, president; and Tinius Olsen, II, vice president.

Exhibiting (in operation): Universal Testing Machine; New designed Impact Machine; Dynamic Balancing Machine; and Proving Ring and Instruments.

OSBORN MANUFACTURING COMPANY
Cleveland ***Booth D-57***

OZALID PRODUCTS DIVISION,
GENERAL ANILINE & FILM CORPORATION
Johnson City, N. Y. ***Booth H-26***

PACKER MACHINE COMPANY
Meriden, Conn. ***Booth H-6***

PAGE STEEL & WIRE DIVISION,
AMERICAN CHAIN & CABLE COMPANY, INC.
Monessen, Pa. ***Booth A-27***

PANGBORN CORPORATION
Hagerstown, Md. ***Booth C-46***

In attendance: V. F. Stine, vice president; A. L. Gardner, advertising manager; J. H. Connolly, New England district manager; W. F. Jones, New York district manager; F. G. Sharpe, Philadelphia district manager; R. M. Trent, Pittsburgh district manager; and B. R. Artz, Syracuse district manager.

Exhibiting (in operation): As the National Metal Congress and Exposition has been dedicated to Metal Production in National Defense, the Pangborn Corporation, the World's Largest Manufacturers of blast cleaning and dust control equipment, will have an exhibit featuring cleaning of scale and dirt from 105 mm. shells with the Pangborn shell blast cleaning cabinet.

In addition there will also be a modern Airless Rotoblast cleaning barrel and an Airless Rotoblast cleaning table, ventilated by a large size unit type Pangborn dust collector which will contain glass windows for the observation of dust separation through the cloth screen filters.

For users of smaller work two suction Air Blast Cabinets will be demonstrated. A new portable dust unit of small size will also be shown.

PARK CHEMICAL COMPANY
Detroit ***Booth 279***

PARKER KALON CORPORATION
New York ***Booth G-53***

In attendance: C. S. Trott, sales manager; and J. J. Mathe, sales engineer.

Exhibiting (in operation):

PARTLOW CORPORATION
New Hartford, N. Y. ***Booth F***

In attendance: H. W. Partlow, president; H. W. Partlow, Jr., vice president; A. M. Stock, vice president; M. G. Hanley, secretary-treasurer; J. K. Clark, development engineer; A. W. Orton, factory superintendent; B. L. Finn, Chicago representative; O. J. Stirling, Detroit representative; W. H. Kay, Cleveland representative; G. T. Desjardins, Cincinnati representative; C. J. Boeringer, Pittsburgh representative; Porter Hurd, Philadelphia representative; and L. G. Webber, Boston representative.

Exhibiting (in operation): A new type of electric temperature control will be featured. This is a two-joint temperature control capable of controlling at either of two temperature settings within very narrow limits. It indicates temperature at all times on a wide scale and also indicates the two temperature settings on the same scale. The temperature settings can be easily adjusted by means of a knurled nut on the outside of the case.

Other types of temperature controls, recorders, etc., suitable for use with gas, air, steam, oil or electricity will also be on display.

P. A. PATTERSON COMPANY
Philadelphia ***Booth C-61***

PENN STEEL CASTINGS CORPORATION
Chester, Pa. ***Booth 298***

See Steel Founders' Society of America.

PENNSYLVANIA ELECTRIC STEEL CASTINGS CO.
Hamburg, Pa. ***Booth 298***

See Steel Founders' Society of America.

PENTON PUBLISHING COMPANY
Cleveland ***Booth 70***

PHILADELPHIA ELECTRIC COMPANY
Philadelphia ***Booth E-58***

PHILLIPS MANUFACTURING COMPANY
Chicago ***Booth 266***

In attendance: W. D. Phillips, president; J. M. Bash, treasurer; R. A. Van Fossen, engineer; Erben Jenkins, engineer; G. R. Angrave, William Printz, A. C. Hamer, Lyman Lloyd, Bernard P. McCafferty, R. K. Ridgeway, and E. F. Koch, sales engineers.

Exhibiting (in operation): A number of models of Phill-Co portable degreasers and Phill-Co portable still.

PHYSICISTS RESEARCH COMPANY
Ann Arbor, Mich. ***Booth 291***

In attendance: E. J. Abbott, president; D. E. Williamson, physicist; J. R. Wieneke and W. C. Dietiker, Profilometer division.

Exhibiting (in operation): Literature and large photographs on the back wall will describe special instruments and research facilities.

The principal attention will be on the Profilometer—the instrument for measuring surface roughness. An instrument will be in operation and measurements will be taken on visitors' samples. The meter reading will be projected on a screen. The internal tracer and the Mototrace will also be in operation.

These Protective Coatings HELP TO SOLVE Two Of Your Most Important CURRENT PROBLEMS

Miccro *Supreme*

STOP-OFF LACQUERS

•

MICCROLITE

Developed and Manufactured by Experienced Platers

Today, you must keep production rolling without interruption . . . and YOU MUST CONSERVE ON THE USE OF PLATING METALS. Miccro-Supreme Stop-Off Lacquers and Miccrolite can aid you on both counts.

In securing effective protection for all types of plating racks, or for masking parts for hard chromium plating, there are no materials which can be applied easier or more quickly. They always stand up through complete cycles of plating operations . . . in all acids and cleaning and plating solutions. As they are applied right in your own plant—and at negligible cost—you have none of the delays caused by outside sources of supply.

These materials provide *complete* protection of every portion of the surfaces they cover. For that reason, unless plating racks are damaged in process, there is no possibility of a surface becoming exposed and of plating metals "piling up" at that point. Waste of valuable plating metals is reduced considerably, and priorities problems can prove much less troublesome.

IF YOU ARE NOT FULLY ACQUAINTED WITH THE ADVANTAGES OF USING "MICCRO PRODUCTS" TO AID IN YOUR DEFENSE PRODUCTION, WRITE FOR INFORMATION — TODAY.

MICHIGAN CHROME & CHEMICAL CO.

6342 EAST JEFFERSON • DETROIT, MICHIGAN

PORTER-CABLE MACHINE COMPANY
Syracuse, N. Y. ***Booth A-37***

In attendance: F. A. Hurd, experimental engineer; F. C. Poulsen, field engineer; K. O. Ditmars, J. G. Wells, J. G. Ray, and M. H. Rochelle, sales engineers; and H. L. Ramsay, sales manager.

Exhibiting (in operation): Belt grinding has been developed to the point where many machining operations can be handled more economically and rapidly on belt grinders. This will be a demonstration of wet and dry belt grinding, disc and spindle grinding, electric saws, and sanders and grinders. Several new machines will be exhibited for the first time, including a new 4-inch wet-dry belt grinder, model G-4, and model G-8, 9-inch wet-dry grinder.
Visitors are invited to bring samples of jobs and to consult with our factory experimental engineers who will be in charge of this booth and in position to advise regarding the advisability of using wet or dry grinding in place of milling and other grinding operations, burring, shaping, cutting, etc. A free booklet on wet-dry belt grinding and various applications, available at the booth.

HORACE T. POTTS COMPANY
Philadelphia ***Booth 250***

PRODUCT ENGINEERING
New York ***Booth 3***

See American Machinist.

PRODUCTS FINISHING
Booth F-57

See Gardner Publications, Inc.

PROGRESSIVE WELDER COMPANY
Detroit ***Booth A-6***

See Resistance Welder Manufacturers Association.

PULMOSAN SAFETY EQUIPMENT CORPORATION
Brooklyn, N. Y. ***Booth H-35***

QUIGLEY COMPANY, INC.
New York ***Booth H-30***

RADIUM CHEMICAL COMPANY, INC.
New York ***Booth C-55***

In attendance: J. A. Kelly, president; G. T. Taylor, vice president; R. V. Lange, sales manager; and P. D. Johnson.

Exhibiting: Radium radiographs of castings, welds and miscellaneous material; apparatus for nondestructive testing; types of radium capsules; film holders; lead containers; operating technic.

N. RANSOHOFF, INC.
Cincinnati, Ohio ***Booth B-10***

RANSOME CONCRETE MACHINERY COMPANY
Dunnellen, N. J. ***Booth B-17***

READING STEEL CASTINGS DIVISION, AMERICAN CHAIN & CABLE COMPANY, INC.
Reading, Pa. ***Booth 298***

See Steel Founders' Society of America.

REEVES PULLEY COMPANY
Columbus, Ind. ***Booth A-53***

In attendance: C. M. Reeves, vice president; W. R. Perry, electrical engineer; T. A. Bergen and P. C. Talbot, Charles Bond Company, Philadelphia; and D. W. Clem, manager, Reeves Pulley Company of New York, Inc.

Exhibiting (in operation): Various designs, models and controls of Reeves variable speed transmissions, Vari-Speed motor pulleys and Vari-Speed motodrives.

REINHOLD PUBLISHING COMPANY
New York ***Booth A-38***

See Metals and Alloys.

REPUBLIC STEEL CORPORATION
Cleveland ***Booth D-36***

RESISTANCE WELDER MFRS. ASSOCIATION
Philadelphia ***Booth A-6***

In attendance: M. S. Clark, Federal Machine & Welder Company; F. E. Taylor, Swift Electric Welder Company; F. H. Johnson, Progressive Welder Company; E. C. Smith, National Electric Welding Machines Company; P. M. Hall, Taylor-Hall Welding Corporation; A. D. Jordine, Welding Machines Manufacturing Company; I. C. Brown, Thomson-Gibb Electric Welding Company; Charles Eisler, Eisler Engineering Company; H. G. Warnke, Multi-Hydromatic Welding Company; Carl Raab, Expert Welding Machine Company; W. M. Levyn, Acme Electric Welder Company; Walter Anderson, Taylor-Winfield Corporation; G. A. Sieger, S-M-S Corporation; J. A. Wieger, P. R. Mallory & Company; R. H. Taylor, Electroloy Company, Inc.; Walter Simmons, Welding Sales & Engineering Company; G. A. Fernley, secretary and treasurer, Resistance Welder Manufacturers Association; and E. J. DelVecchio, in charge of booth.

Exhibiting: A lounge and general meeting place is provided where common discussion of all phases of resistance welding can be held. Engineers and representatives from all member companies will be on hand to discuss any problems or applications concerning resistance welding.

REVERE COPPER & BRASS COMPANY
New York ***Booth 248***

J. E. RHOADS & SONS
Philadelphia ***Booth A-57***

RIEHLE TESTING MACHINE DIVISION, AMERICAN MACHINE AND METALS, INC.
East Moline, Il. ***Booth D-29***

In attendance: Alfred Sonntag, chief engineer and sales manager; R. H. Herring, sales and service engineer; E. R. Glenn, Philadelphia district engineer; A. F. Green, Hartford representative; C. A. Hogentogler, Jr., Washington, D. C., representative; R. A. Armstrong, Cleveland representative; and William Printz, New York representative.

Exhibiting (in operation): Precision hydraulic Universal testing machine, 120,000-pound capacity; Screw power type, Universal testing machine, 60,000-pound capacity; Vickers pyramid hardness testing machine; combination Izod-Charpy-tension impact testing machine; hydraulic type Brinell hardness tester. Various extensometers and center punches.

JOHN A. ROEBLING'S SONS COMPANY
Trenton, N. J. ***Booth H-16***

R. S. PRODUCTS CORPORATION
Philadelphia ***Booth D***

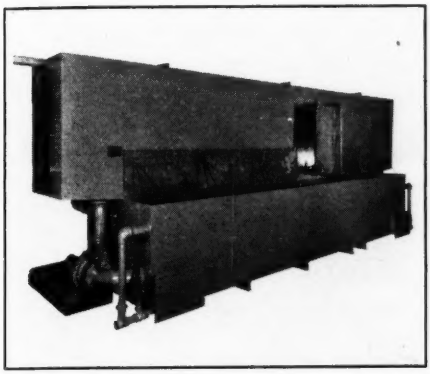
In attendance: W. E. Borbonus, president; D. E. Wyman, chief engineer; D. W. Hopkins, assistant chief engineer; and Earl Gorman, sales manager.

Exhibiting (in operation): Butterfly valves and balopticon showing views of gas heat treating furnaces.

RUUD MANUFACTURING COMPANY
Pittsburgh ***Booth O***

The Great Step Ahead In Cleaning All Metals

Neutral Synthetic Solvents that Mix with Water



(1) Cut All Soil
(2) Brighter, Faster
(3) No Inert Residues
(4) No Tack Wiping
(5) No Spots or Bloom
(6) No After-Cleaning Rust
(7) Lower Cleaning Cost
(8) No Health Hazard
(9) No Priority Required
(10) Over-night Conversion

★ Ample Supply Available For Volume Production

Revolutionary—yet proven in dozens of the greatest plants through 5 years! A radically new chemical principle—used in your equipment or in patented Solventol Washers. Adaptable to most of your difficult or costly surface conditioning problems—aluminum sheet or parts—steel, copper, brass, alloys, cast iron—spray paint reclaiming, etc. Get a survey and test without cost.

SOLVENTOL Super-Cleaning

Write to Solventol Chemical Products, Inc., Detroit

JOSEPH T. RYERSON & SON, INC.
Chicago ***Booth G-17***

In attendance: G. Van Dyke, manager, special steels department; J. W. Queen, Jr.; H. B. Briggs; G. F. Roeder; and C. C. Bray.

Exhibiting: An interesting informative display dramatizing the features of Ryerson steel service to American industry. As a special feature of the exhibit visitors will be shown samples of machining and carburizing A 4119, the new non-nickel carburizing steel.

SALEM ENGINEERING COMPANY
Salem, Ohio ***Booth 1***

GEO. SCHERR & COMPANY
New York ***Booth B-43***

A. SCHRADER'S SON
Brooklyn, N. Y. ***Booth B-51***

SCIAKY CORPORATION
Chicago ***Booth 242***

SCULLY STEEL PRODUCTS COMPANY
Chicago ***Booth, Stage***

See United States Steel Corporation.

SELAS COMPANY
Philadelphia ***Booth E***

In attendance: F. O. Hess, president; R. C. Jordan, Pennsylvania representative; W. M. Smith, New York representative; W. D. Fuller, New England representative; E. A. Furkert, Mid-West representative; E. D. Allen, Michigan representative; J. Smith, Chicago representative; J. A. Ehlinger, J. Kniveton, and R. E. B. Wakefield, engineers; R. F. Apter, research engineer; C. P. Mann, engineer; and H. W. Smith, Jr.

Exhibiting (in operation): Improved methods of firing with direct radiant gas heat—for faster production, better temperature distribution, fuel economy, simpler furnace construction, and closer control. Emphasis will be placed upon furnace applications of controllable radiant-roof and radiant-wall gas firing to: the annealing of nonferrous, stainless and alloy wire and strip; the normalizing of cast, forged, drawn, extruded and fabricated elements; the melting of nonferrous metals; the heat treatment of dies and special alloys; and the curing of organic finishes.

Completely automatic flame hardening equipment adapted to the user's special requirements and utilizing superheated gas-air combustion. The flame hardening of such work as gears, saws, blades, valves, machined parts and special mechanism shapes will be demonstrated.

Precision refractory burners, including radiant, screen, ribbon, torch, pin-point and special types.

Combustion control equipment of high accuracy, including constant-pressure constant-ratio gas-air mixing machinery, high pressure inspirators, etc.

Indicating flow meters for gas and air.

SELLERS ENGINEERING COMPANY
Chicago ***Booth R***

SENTRY COMPANY
Foxboro, Mass. ***Booth 8***

SLEEPER & HARTLEY, INC.
Worcester, Mass. ***Booth B-1***

In attendance: W. H. Blount, president and general manager; C. F. Fisher, chief engineer; and L. D. Laroche, demonstrator.

Exhibiting (in operation): Three S & H Universal spring coilers of latest design, namely No. 0, No. 1, and No. 1½ equipped with variable speed drive and all up to date equipment.

One S & H No. 0 torsion spring machine, Series 607. Equipped with compound geared head, free wheeling feed, arbor stripping attachment and other refinements.

A display of Larkin air vises in various sizes.

S-M-S CORPORATION
Detroit ***Booth A-6***

See Resistance Welder Manufacturers Association.

SPECIALTIES MANUFACTURING COMPANY, INC.
Bloomfield, N. J. ***Booth G-38***

In attendance: Lewis Randolph, sales engineer.

Exhibiting (in operation): A lathe upon which our several attachments will be placed. An active demonstration will be given. We will also actively demonstrate powered Simplex Stock Reel.

SPENCER TURBINE COMPANY
Hartford, Conn. ***Booth 35***

Exhibiting (in operation): Complete line of centrifugal type Turbo-compressors used extensively for supplying low pressure air on oil and gas fired furnaces, the accepted standard for furnace work and recommended by the leading furnace manufacturers. See our operating exhibit with both 1750, 3500 r.p.m. and belt driven Turbo-compressors. In addition we will demonstrate our heavy duty vacuum cleaner used extensively in industrial plants for general cleaning.

STANDARD ALLOY COMPANY
Cleveland ***Booth 11***

STANDARD PRESSED STEEL COMPANY
Jenkintown, Pa. ***Booth A-58***

STANDARD STEEL SPRING COMPANY
Coraopolis, Pa. ***Booth 203***

In attendance: Richard Rimbach, technical adviser, and T. N. Berlage, sales manager, Corronizing division.

Exhibiting: Corronized fly screen, manufactured by the Hanover Wire Cloth Company, and which was sold this year by Sears, Roebuck and Company; outboard motors with the essential parts Corronized, and which are manufactured by the Evinrude Plant of Outboard, Marine & Manufacturing Company; golf clubs in which the shafts and heads are Corronized, and which are designed by Willie Hoare, golf technician, and assembled by Wilson Sporting Goods Company; milk pails which are fabricated by Richardson Company for Sears, Roebuck and Company.

STANDARD STEEL WORKS
Burnham, Pa. ***Booth E-6***

See Baldwin Group.

STEEL
Cleveland ***Booth 70***

See Penton Publishing Company.

STEEL FOUNDERS' SOCIETY OF AMERICA
Cleveland ***Booth 298***

STEEL PUBLICATIONS, INC.
Booth B-33

See Heat Treating and Forging.

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NO BUILD-UP!
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RUST RESISTANT!

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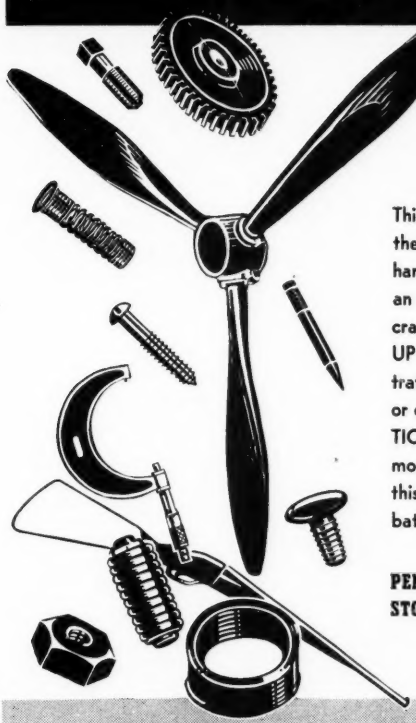

This attractive BLACK finish actually penetrates into the steel. The quality of its rich appearance is enhanced by natural durability and rust-resistance. As an integral part of the steel it cannot peel, chip, crack, craze or rub off. • • • POSITIVELY NO BUILD-UP or size change of the part treated, making Pentrate an ideal application for bearings, precision work or close assembly parts—and renders PROVEN FRICTION REDUCTION and WEAR RESISTANCE on moving surfaces. • • • Economical, easy to operate, this Government approved LOW TEMPERATURE bath can be fitted quickly into your production line.

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HEATBATH CORPORATION
SPRINGFIELD, MASSACHUSETTS

STOLER & CURLL, INC.
Philadelphia ***Booth A***

STOODY COMPANY
Whittier, Calif. ***Booth E-61***

In attendance: J. R. Spence, general sales manager; George Griffin, Jr., assistant sales manager; G. F. Staley, advertising manager; and K. B. Trapp.

Exhibiting: Unprotected and hard-faced specimens. Printed case histories under each specimen will explain the advantages of protecting wearing surfaces with Stoody hard-facing alloys. Also our entire line of hard-facing alloys as well as blast cleaning nozzles, wear resistant castings, and other products.

D. A. STUART OIL COMPANY
Chicago ***Booth C-1***

In attendance: W. H. Oldacre, T. B. Langdon, W. H. Huelster, W. M. Duncan, F. J. Schmitt, and H. D. Frueauff, Jr., Chicago; C. H. Baker, Cleveland; W. F. Aske, Detroit; C. J. Nagel, Syracuse; A. J. McDuff, Boston; J. J. Rodnite, New York; and J. Y. Umbarger, Philadelphia.

Exhibiting: Samples of munition and airplane parts machined with Stuart oil products, as well as data featuring the new developments in metal working oils required for various forms of modern machining. There will be samples of stainless steel and other alloy steels machined, deep drawn or ground with the following: Stuart's "Thred-Kut" oil, "Super-Kool" oil, "Solvol" liquid cutting compound, "Codol" liquid grinding compound, and "Kleen-Kut" soluble oil.
New type machinery lubricants available in viscosities and consistencies ranging from that of light ice machine oil to the heaviest bodied gear lubricant, and in the case of greases from soft to hard will be featured. In each case the load carrying capacity is at least 300 per cent higher than that of straight petroleum oil or ordinary grease of corresponding "body." Samples of light, medium and heavy "EP" oils and greases for machine tool applications will be available for inspection, comparison and engineering discussion.

SUMMERILL TUBING COMPANY
Bridgeport, Pa. ***Booth H-29***

In attendance: G. E. Parker, general manager of sales; J. P. Dods, research engineer; C. D. Townsend, product research; A. J. Williamson, chief metallurgist; Lloyd Zeigler, assistant metallurgist; and H. B. Lawson, sales department.

Exhibiting (in operation): A draw bench drawing tubes, both in the round and shapes. Two racks illustrating approximately 30 step-tapered and formed tubes for aircraft structures.
Also, 7 display panels showing many different types of special Summerill shapes produced from seamless tubing.

SUPERIOR TUBE COMPANY
Norristown, Pa. ***Booth H-46***

In attendance: S. L. Gabel, general manager; R. H. Gabel, vice president; H. B. Brown, Jr., sales manager; C. W. Buler, superintendent; A. M. Bounds, metallurgist; R. E. Funk, assistant to superintendent; and W. C. Hanna, assistant to metallurgist.

Exhibiting (in operation): A model draw bench showing cold-drawing of small sizes of ferrous and nonferrous tubing. There will be a special display of the smallest tube in the World, as shown at the New York World's Fair. It measures .0019 inch outside diameter. Panels will hold samples of the various analyses and types of tubing redrawn in sizes $\frac{5}{8}$ inch outside diameter and smaller.
While seamless tubing represents the large part of Superior production, special emphasis will be also given to Weldrawn and Brawn.

SURFACE COMBUSTION CORPORATION
Toledo, Ohio ***Booth J***

SWIFT ELECTRIC WELDER COMPANY
Detroit ***Booth A-6***

See Resistance Welder Manufacturers Association.

SYNTHANE CORPORATION
Oaks, Pa. ***Booth G-35***

In attendance: J. B. Rittenhouse, vice president; G. A. Ebelhare, superintendent; S. W. Place, chief engineer; and F. I. Bennett, chemical engineer.

Exhibiting: Laminated Bakelite sheets, tubes and rods, and fabricated parts of all kinds.
Our display will also include the celebrated Synthane Noisometer, which has been shown all over this country in connection with the Bakelite Cavalcade. This Noisometer shows the relative noise generated by a metal set of gears compared to a train of gears with one laminated bakelite intermediate. The sound generated is converted into light waves, and the observer is actually able to see sound.

C. J. TAGLIABUE MANUFACTURING COMPANY
Brooklyn, N. Y. ***Booth 225***

TAYLOR-HALL WELDING CORPORATION
Worcester, Mass. ***Booth A-6***

See Resistance Welder Manufacturers Association.

TAYLOR-WINFIELD CORPORATION
Warren, Ohio ***Booth A-1 and A-6***

TEMPIL CORPORATION
New York ***Booth 28***

TENNESSEE COAL, IRON & RAILROAD COMPANY
Birmingham, Ala. ***Booth, Stage***

See United States Steel Corporation.

THOMSON-GIBB ELECTRIC WELDING COMPANY
Lynn, Mass. ***Booth A-6***

See Resistance Welder Manufacturers Association.

TIDE WATER ASSOCIATED OIL COMPANY
New York ***Booth 292***

In attendance: H. G. Mullen, industrial sales manager; W. B. Joachim, territorial sales manager; Walter Sauer, industrial advertising manager; F. W. Hallam, cutting oil engineer; W. R. Carr, W. H. Marshall, J. S. Neisser, D. F. Dunkle, Geo. Roth, and J. O. Dunham, salesmen.

Exhibiting (in operation): Tycol sulphurized cutting oils and Tycol soluble cutting oils; also Tycol industrial lubricating oils and greases.

TINNERMAN PRODUCTS, INC.
Cleveland ***Booth 45***

TITANIUM ALLOY MANUFACTURING COMPANY
Niagara Falls, N. Y. ***Booth F-16***

TREADWELL ENGINEERING COMPANY
Easton, Pa. ***Booth 298***

See Steel Founders' Society of America.

HAROLD E. TRENT COMPANY
Philadelphia ***Booth A-59***

TRIPLEX MACHINE TOOL COMPANY
New York **Booth B-16**

In attendance: Nicholas Cetrule, proprietor; John Cetrule, general manager; J. H. Schleiffer, sales promotion manager; S. Muscatello, treasurer; E. R. Wilson, A. R. Grillo, R. Dillon, Charles Falcone, and F. J. Lanz, salesmen; Alex Kevra, sales engineer; A. H. Halabi and R. Quinn, servicemen; D. I. Wilson, sales engineer; Oscar Schlichter, factory manager; and Fred Schlichter, production manager.

Exhibiting (in operation): Automatic Screw Machine and Spur Gear Hobbing Machine.

UNA WELDING, INC.
Cleveland **Booth 207**

In attendance: W. B. Baker, president; R. P. Tarbell, general sales manager; P. J. Cella, assistant sales manager; K. W. Schreeck, chief engineer; Joseph Skuhrovec, electrical engineer; Donald Edgar, sales engineer; and D. C. Anderson, district representative.

Exhibiting: Two portable type automatic heads, one mounted on a heavy duty carriage, self-propelling with complete cabinet mounting, together with the head. Small portable tractor, light weight for the shipbuilding industry, especially adapted for easy handling. A Una A.C. welding transformer with power factor correction built in.

UNITED STATES STEEL CORPORATION
Pittsburgh **Booth, Stage**

Exhibiting: The entire stage of the Commercial Museum Exhibit Hall in Philadelphia will be used by United States Steel Corporation in presenting their joint subsidiaries exhibit.

Based on the theme that research and industrial development actually furnish what many think of as the almost magical results obtainable with modern steels, the United States Steel exhibit will combine pleasant, unusual entertainment with helpul hints on how to solve steel problems confronting industry today.

The center of the stage will be occupied by a 50-seat theatre, its stage being revealed when a spectacular ladle completes teeming six large ingot molds. Auxiliary stage settings in both wings will present supplementary 3-minute animated puppet shows, complete with sound, while colorful photographs, illuminated transparencies and special exhibits will be worked into the background of the exhibit as a whole.

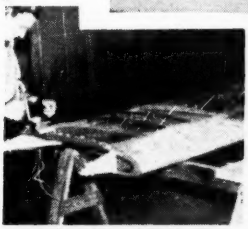
Technical and sales representatives will be in constant attendance at the exhibit at all times to discuss problems with visitors, and ample seating facilities will be provided to make a stop at the exhibit restful.

Co-operating in this joint exhibit will be American Bridge Company, American Steel & Wire Company, and Cyclone Fence Division, Carnegie-Illinois Steel Corporation, Columbia Steel Company, National Tube Company, Scully Steel Products Company, and Tennessee Coal, Iron & Railroad Company, all subsidiaries of United States Steel Corporation.

VULCAN IRON WORKS
Wilkes-Barre, Pa. **Booth 298**

See Steel Founders' Society of America.

WALL-COLMONOY CORPORATION
Detroit **Booth B-55**



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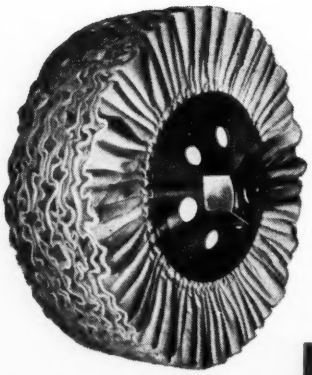

Adopt a buff that will do better work, faster—and costs less. AIRWAY VENTILATED BUFFS have achieved and will achieve increased production, and at 50% less cost.

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JACKSON BUFF C

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AIRWAY *Ventilated* BUFFS

IMPORTANT AIRWAY FEATURES

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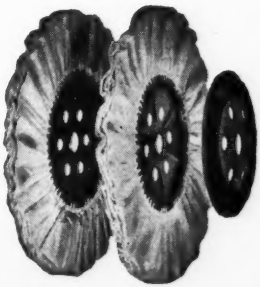

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LONG ISLAND CITY, N. Y.

ty, New York, has rights to U. S. Patent Nos. Re 19,894 and 2,140,208 means for the admission of air through the sides of the buff. Owner l rights and stop infringement.

WELDING ENGINEER PUBLISHING COMPANY
Chicago ***Booth H-53***

In attendance: T. B. Jefferson, editor; D. R. Watson, Midwest advertising representative; T. E. Depew, Eastern advertising representative; T. L. Lawless, Lee Plume, and Robert Gaston, circulation representatives.

Exhibiting: The Welding Engineer and The Welding Encyclopedia. There will also be a graphic display of wall charts which will depict the growth of the welding industry during recent years as well as display information of pertinent interest to those engaged in welding, and the many engineering problems encountered in this industry will be discussed.

WELDING MACHINES MANUFACTURING CO.
Detroit ***Booth A-6***

See Resistance Welder Manufacturers Association.

WELDING SALES & ENGINEERING COMPANY
Detroit ***Booth A-6***

See Resistance Welder Manufacturers Association.

WELLS MANUFACTURING CORPORATION
Three Rivers, Mich. ***Booth E-54***

WESTINGHOUSE ELECTRIC & MFG. COMPANY
East Pittsburgh, Pa. ***Booth E-1***

In attendance: L. M. Gumm; J. F. Kelly; W. R. Bernardi; W. W. Reddie; E. H. Vedder; and J. H. Germany.

Exhibiting (in operation): Introducing for the first time a new electric welder which is in tune with the current defense theme. Its external appearance is very much like a two-tone torpedo. Its electric features include a pre-set current adjustment along with an arc control. The operation and adjustment of this welder are very much similar to the current fluid drive in automobiles.

Many brazing furnace samples will clearly show how to increase production by use of the Westinghouse brazing furnace with controlled atmosphere. Tons of brazed complicated parts can be turned out by the brazing furnace. Be sure to see and ask about these samples.

Resistance welding electric contactors (Weld-o-trol) and heat control will be not only displayed but an animation of the electrical circuit for these devices will clearly show how the weld is controlled.

Phos-copper brazing will be demonstrated and samples exhibited of the alloys: Cupaloy, Hypernik, Konal and Kovar.

WHEELCO INSTRUMENTS COMPANY
Chicago ***Booth 41***

In attendance: R. A. Schoenfeld, vice president and sales manager; T. A. Cohen, vice president and chief engineer; J. F. Wade, Philadelphia district manager; D. A. Campbell, New York district manager; J. A. Ariano; Herbert Proske; and George W. Hall, Boston district manager.

Exhibiting (in operation): A working model of a controlling pyrometer of the most advanced design. This instrument is made up in unit construction, so that it may be assembled or dis-assembled for service or exchange rapidly.

In addition to this particular instrument which will be the center of display, we will have in operation, as usual, our line of combustion safe-guards, Flame-otrols. We will also show our Limitrols, excess temperature cut-outs, our portable potentiometers, our surface type pyrometers and our line of indicating pyrometers. Models of practically all instruments will be in operation.

S. B. WHISTLER & SONS, INC.
Buffalo, N. Y. ***Booth G-50***

In attendance: L. V. Whistler, Jr.; J. C. Rumbarger; and A. C. Jackson.

Exhibiting (in operation): A 2½ Niagara Press. Will feature adjustable piercing dies. Several small die sets complete and individual parts for piercing sheet metal.

WICKWIRE SPENCER STEEL COMPANY
New York ***Booth B-12***

In attendance: F. W. Hale, sales manager mechanical specialties; M. G. Werme, plant superintendent; K. A. Zollner, advertising manager; A. G. Goldsmith, district manager; F. A. Hayward, F. M. Whitney, Jr., and A. J. Gillis, salesmen; V. C. King and A. Ambruson, belt engineers; and M. G. Butler, salesman.

Exhibiting: An illustrative panel display of the principal Wickwire Spencer wire products. Included among these are Wissco metal conveyor belts made for a wide range of applications from subfreezing temperatures to as high as 2100° F.; torsion, extension, compression, coil, flat, motor and clock springs and wire forms; high and low carbon wires in various tempers, grades and finishes; industrial wire cloths, perforated metals, wire rope, welded fabric, and chain link fence.

LEE WILSON SALES CORPORATION
Cleveland ***Booth F-6***

WILSON MECHANICAL INSTRUMENT CO., INC.
New York ***Booth 53***

WIRE ASSOCIATION
Stamford, Conn. ***Booth A-34***

YALE & TOWNE MANUFACTURING COMPANY
Philadelphia ***Booth C-6***

CHARLES R. YERGER COMPANY
Philadelphia ***Booth H-51***

In attendance: C. R. Yerger; Theodore Grob; Benjamin Grob; A. M. Steelhammer; and A. Gabriel.

Exhibiting (in operation): Grob Brothers die sawing and die filing machines will be in operation sawing, filing, and lapping intricate shapes both internal and external, fast, accurate and economical.

Acme Industrial Company Standard drill jig bushings, hardened and ground work, also precision lapped flat surfaces.

Cratex Abrasive Wheels and Points for fine grinding and polishing are the subject of a six-page illustrated folder prepared by the Cratex Mfg. Co., 81 Natoma St., San Francisco, Cal. The folder lists the various sizes of the Cratex Wheels and Points and describes the five grits in which these wheels and points are available; namely, coarse, medium, fine S. T. 120, and extra fine. Copy free upon request.

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Because DU-LITE, in addition to an attractive finish, is more durable and rust resistant.

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Because continued supply of DU-LITE salts is certain.

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MIDDLETOWN • CONNECTICUT

Copper Oxide Rectifiers for the Electroplating Industry

By I. ALBERT LEE
General Electric Company, Bridgeport, Connecticut

IT should be clearly understood that there is no quarrel between rectifiers and motor generators, and it is not the intention of this paper to make a comparison of the merits of these two devices. However, in view of the fact that the motor generator has served the plating industry for a great many years and, therefore, is thoroughly understood by the men in the plating industry because of their familiarity with it, some comparisons will be drawn between the two types of units. It should be understood, however, that these comparisons are merely for the purpose of a clearer understanding of the rectifier.

A clearer understanding of copper oxide rectifiers will enable the men in the plating industry to determine whether or not there is a place in the plating industry for this device, and if so just what that place is. This paper has been prepared with this thought in mind. In order to determine whether or not this type of device has a place in the plating industry, it might be well to state a few of the requirements of any piece of equipment necessary in this industry.

DURING the past several months I have been privileged to visit with individuals in the plating industry for the purpose of discussing copper oxide rectifiers as applied to that industry. As would be expected, these individuals asked many questions about it. These questions were indicative of a tremendous interest in rectifiers, and some of the questions indicated that there was considerable misunderstanding of rectifiers and a certain mystery about this device.

These various questions were transmitted to Mr. E. A. Harty of our engineering department, who is one of the outstanding authorities on copper oxide rectifiers, and probably has had more research, development and design experience with this device than any other man. I have merely attempted to combine these questions and answers in a readable form, in an endeavor to clear up some of the misunderstandings and remove the mystery from copper oxide rectifiers.

Therefore, if the questions asked have been of such a nature to lead to a better understanding of this device, then credit must be given to the men in the industry who have asked them, and if the answers given are satisfactory, and help to remove all mystery from copper rectifiers, then full credit must be given to Mr. Harty.—I. ALBERT LEE.

Probably the first requirement is that the work done with the new equipment be equal to that done with existing equipment, for if there is a lessening in the quality of the work done, there would be no room in the industry for that piece of equipment. The equipment must of necessity be reliable and, the reason for this is self-evident. The equipment should have high efficiency because the power used in plating is relatively large and consequently high efficiency is an important factor.

The equipment should be economical in first cost as well as in operating cost, for unless the equipment is economical in first cost, it is doubtful if it would prove an economical investment. A new piece of equipment should offer some advantage over existing equipment; for if there are no advantages over existing equipment, there seems to be no reason to change from existing equipment. In other words, the new equipment should offer some advancement in the art of electroplating. The equipment should be easy to operate and easy to maintain. Perhaps all of these could be summarized by saying that the equipment should do a better job, or at least an equal job, in a better way.

These are probably minimum requirements, and in order to determine if the copper oxide rectifier meets these requirements, any misunderstandings regarding this device should be cleared up, and any mystery about it should be removed, and to assist in this, a few definitions seem to be necessary.

For the purposes of this discussion, the word "Rectifier" will be used only to designate a complete plating equipment such as shown in Figure 1. The rectifier element will be called a "Valve," as the copper oxide rectifier element is actually an electrical valve.

A little discussion of this point will help to remove the mystery from rectifiers. For example, the ordinary definition of a rectifier as given in Webster's Unabridged Dictionary is, "any device that has A-C put into it and takes D-C out of it." Under this

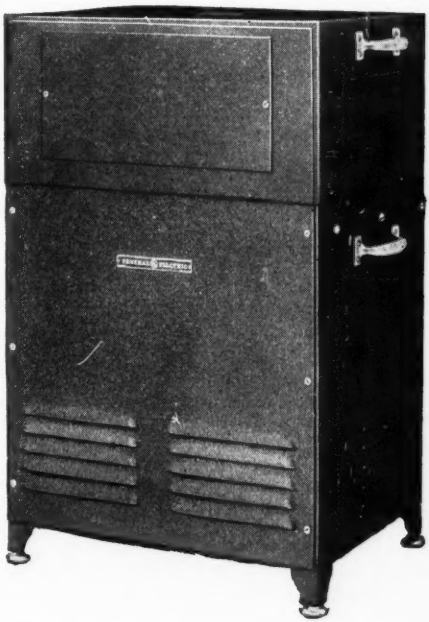

Fig. 1—Copper oxide rectifier designed for use in the electroplating field.

definition, of course, a motor generator would be included as a rectifier because A-C is put into the motor and D-C taken out of the generator. More to the point, however, would be the commutator of the generator which, after all, is actually a rectifier. Webster defines a commutator as, "an attachment for the armature of a dynamo for commutating or RECTIFYING the induced current in the armature conducted . . .". As a matter of fact, the commutator might more accurately be called a rectifier than a commutator.

As is well known, the current generated in the coils of the armature is an alternating current; and the commutator together with the brushes "picks-off" the A-C humps and

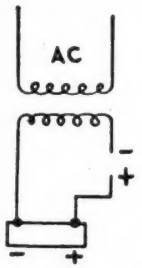

Fig. 2—Illustration showing the circuit of a single copper oxide element.

causes the output voltage to be always in the same direction which is known as a direct current. Since the commutator contains no mystery, the first comparison that is made is between the commutator and the rectifier element, or valve. Both of these devices do the identical job. The commutator does it by means of a rotating armature in connection with brushes and, might be called, a mechanical electrical valve. The copper oxide rectifier element does the same job with no moving parts and might be called an electronic electrical valve. There are other so-called dry type rectifiers that do this same job by means of a chemical action, and they might be called chemical-electrical valves. Therefore, as stated, for this discussion the term "Valve" will be used for the rectifier element, as it more accurately defines this device.

In order to give a clearer understanding of the valve action of the copper oxide element, an analogy is made between it and the ordinary tire valve. This is not a new analogy, but gives a clear mental picture of the action of an electrical valve.

It is well known that when pumping air into a tire, the valve prevents the air from coming out of the tire between down strokes of the pump plunger. That is, although the pump plunger moves in two directions—up and down—air flows in only one direction—that is, into the tire. A single copper oxide element is a single valve and is normally called a "half-wave rectifier." The circuit of this rectifier is shown in Figure 2. When current is in ore direction in the transformer coil, current flows through the load circuit, but when current is in the opposite direction, the valve closes and no current flows.

Two electrical valves can be connected in a single phase circuit with a mid-tap transformer as shown in Figure 3 to give full-wave rectification. Four electrical valves can be connected in a conventional bridge circuit on single phase to give full-wave rectification. Three electrical valves could be connected in a three-phase four-wire circuit as shown in Figure 4 to give what is known as half-wave three-phase rectification. Six electrical valves could be con-

Fig. 3 — This drawing shows the manner in which two electrical valves can be connected in a single phase circuit with a mid-tap transformer.

nected to give full-wave three-phase rectification.

In order to clear up some misunderstanding regarding the copper oxide valve, a brief history of its development and a short story of the manufacturing processes seem almost essential.

The first copper oxide valves were small discs of relatively low wattage

rating. These were manufactured by placing the disc in an oven at very high temperature and oxidizing the removed by a chemical process so that the completed valve consisted of the mother copper with the red oxide.

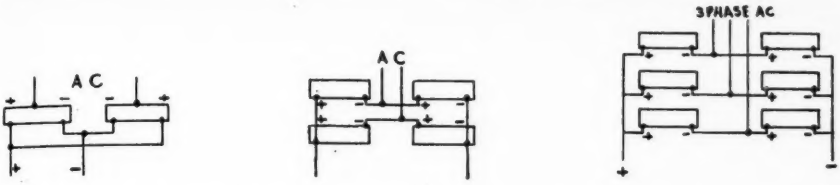

Fig. 4—Three electrical valves can be connected in a three-phase four-wire circuit as shown here.

exposed surface. Red oxide was formed next to the mother copper, and black oxide was formed on top of the red oxide. The rectifier action, however, apparently takes place between the mother copper and the red oxide, and the black oxide is not essential to a good rectifier. As a matter of fact, it was found that by removing the black oxide a better rectifier was made. Therefore, the black oxide was

To obtain high output, several of these valves were mounted on a bolt and connected in series, parallel, or series-parallel.

In order to make good electrical contact between valves, a relatively soft metal washer was used next to the oxide surface and the whole assembly tightened under high pressure. Through years of experience in this manufacturing process, a very

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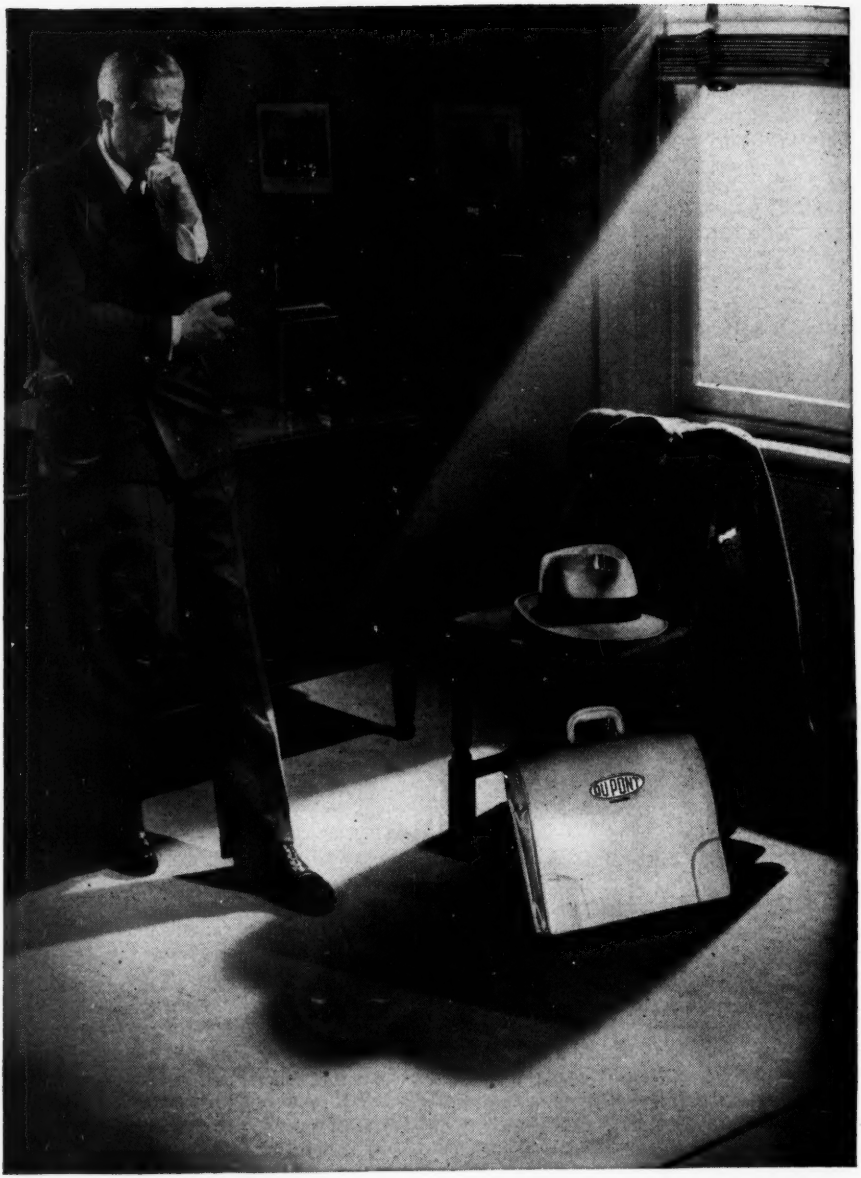

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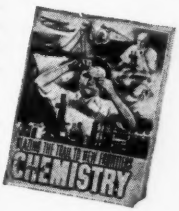

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high skill was developed with the result that the disc type rectifiers today are still manufactured fundamentally in the same manner. However, research has been continued ever since the first units were made and, of course, is still being continued. One of the important things that was learned about these rectifiers was that if the temperatures were held down, the rating would be increased, and consequently forced ventilation was introduced about 1929.

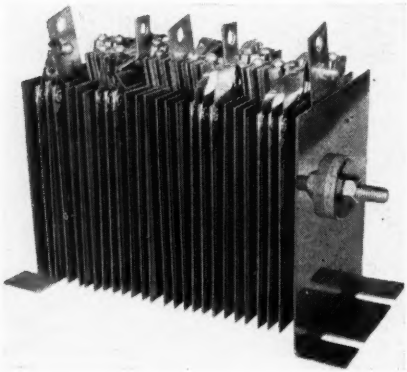

Fig. 5—Individual valves are assembled in a stack as shown here.

Out of the research has come another processing method, and it was developed because of the increasing demand for higher wattage output rectifiers. It was relatively easy to assemble the small disc under high pressure and obtain even distribution of pressure, and consequently good contact, however, there were mechanical obstacles to assembling larger discs in this manner. With a large disc it was difficult to get bolts strong enough to maintain a constant pressure in order to give good contact between valves.

Many experiments were conducted with larger copper oxide valves, and finally a process was developed which made it unnecessary to use high pressure for making contact between valves. This method consists of a slightly different processing. Instead of removing the black oxide by a chemical process, the black oxide and part of the red oxide is reduced to copper, so that the completed valve consists of the mother copper with the red oxide and on the red oxide a layer of reduced copper. In order to protect this thin layer of copper, the unit is nickel plated. So the completed valve is one homogeneous piece of metal, and is as permanent as the metal itself.

The completed valves are assembled on a stack as shown in Figure 5 which, in turn, are mounted in a casing together with the necessary transformers, control devices, blowers, and so on, in order to make a complete rectifier as shown in Figure 1.

With this brief history and story of manufacturing process, it should be easier to consider whether or not the copper oxide rectifier meets the requirements of the electrical plating industry as previously outlined.

The first requirement was that it do an equal job of existing equipment. Assuming that existing equipment is a motor generator set, it has already been observed that the generator actually generates A-C which is converted to D-C by the commutator. There is, therefore, a definite "commutator" ripple on direct current from a generator. The frequency of this ripple will depend on the design of the generator and is a factor of the number of poles, the number of commutator segments, and so on. The rectifier takes its A-C from a transformer, and by means of the electrical valve, converts the output to D-C. There is also a "ripple" and the ripple is dependent on the frequency of the circuit and the type of rectifier, that is, whether full-wave or half-wave. In the case of copper oxide rectifiers for electroplating ap-

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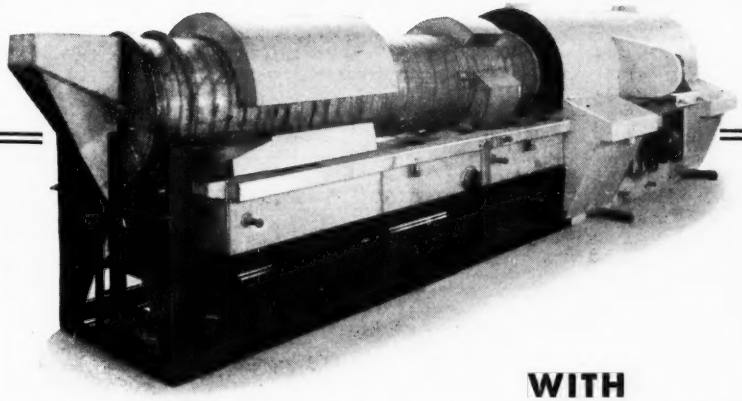

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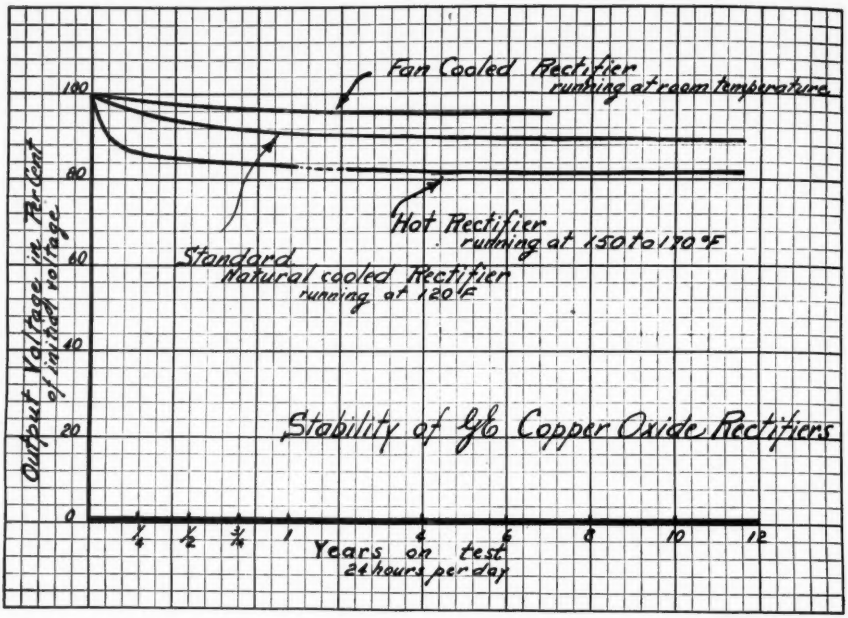

Fig. 6—Graph showing the stability of General Electric copper oxide rectifiers.

plications, full-wave three-phase rectification is used. On a 60 cycle circuit, there are 360 peaks per second, as there are 6 peaks per cycle. Therefore, the output current of a rectifier is at least equal to that of existing equipment.

Another requirement is that the equipment is reliable. There are several factors in connection with this particular requirement as regards the copper oxide rectifier. Probably, however, reliability of the valve is what should be considered, as it is the heart of a copper oxide rectifier. Perhaps along with the subject of reliability should also be considered the subject of life, as these two characteristics would seem to be very closely associated. Figure 6 shows life tests of copper oxide valves which have been in operation for twelve years.

Although there are available literally thousands of curves in connection with this subject of life and reliability, the one curve shown in this figure seems to tell the most important story as regards to life. The significant thing about this curve is the "knee," and it is apparently a lack of understanding regarding this knee that has caused some misinformation regarding copper oxide rectifiers to have been promulgated in the plating industry. It will be noted that the output drops for a short while after the rectifier is placed in service. Then the knee occurs and the output stabilizes. Just where this knee occurs and how much drop in output there is from the original output is dependent on several factors. The drop in output is caused by a change in resistance of the electrical valve, but the resistance ap-

parently becomes fixed after a certain line, depending on operating conditions, and so on, after which there seems to be no further change.

It has been learned that temperature rise is one of the important factors in connection with where this knee occurs, with relation to time, and drop in output; and a complete family of curves could be drawn to indicate this point. Where the temperature rise is low, the knee occurs relatively soon with but very little drop from the initial output; but where the temperature rise is high, the knee occurs after a longer time at a lower output. Using forced ventilation, a temperature rise of only two to three degrees is obtained on copper oxide units, from which it would be expected that the aging curve would be in accordance with the top curve on Figure 6. However, on General Electric Copper Oxide Rectifiers the transformer design is such and taps are furnished to take care of the worst possible condition that could arise which would be in accordance with top curve in Figure 6.

Twelve years of tests of this kind seem to prove quite conclusively that the valve action is entirely electronic; and since the output has stabilized and remained stable for nearly twelve years, these conclusions seem justified. Therefore, we can draw the conclusion that the life of the valve which, as stated previously, is one homogeneous piece of metal, is equivalent to the life of an ordinary piece of copper wire that is carrying a current. It might be compared to the life of the buses now running to the tanks in most plating rooms. That is, the mere carrying of current does not physically or chemically change the bus and consequently it is expected to last indefinitely.

Another simple analogy to the ag-

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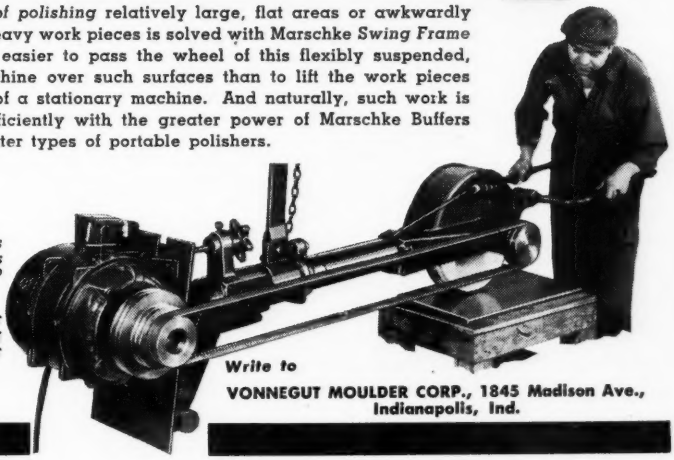

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ing and stabilization of the copper oxide valve is as follows. It is conceivable that a piece of copper wire could be installed with supports spaced every four feet, and the wire pulled up tight so that there is no sag. If this installation were not disturbed for considerable length of time, it would be found at some later date that due to its own weight, the wire had stretched and no longer would be tight. However, it will be agreed that this wire would continue to serve as a suitable conductor. The aging of the copper oxide valve is analagous with but a slight difference, that, the rating given the rectifier is the aged rating, so the rectifier will be 100 per cent of its rated output after aging.

At this point it should be carefully pointed out that so far as the author is aware, the copper oxide valve is the only electronic valve that has this definite characteristic. There are other types of dry rectifiers available which apparently have an electrolytic action, and, of course, these should not be confused with the copper oxide rectifier which so far as can be determined is entirely electronic in its operation.

To draw one more comparison between the familiar motor generator and the unfamiliar rectifier, it will be noted that the valve action of the generator is obtained mechanically, that is, a rotating commutator and brushes whereas the copper oxide rectifier valve action is obtained electronically with no moving parts, and no chemical changes.

Another requirement was high efficiency. This seems to be a subject that has been severely abused in connection with rectifiers. The efficiency of the copper oxide valve is dependent on the type of circuit in which it is used. When used in a three-phase circuit to give full-wave recti-

The personnel of The Chattanooga Stamping & Enameling Company, Chattanooga, Tenn., lines up a "V" for Victory behind the new defense plant insignia recently authorized for display by the OPM. This company has made available the official 4 ft. x 6 ft. sign in vitreous porcelain enamel for immediate shipment to the thousands of plants thruout the country with 50 per cent or more of their production devoted to defense work.

fication, the efficiency of the valve is approximately 83 to 84 per cent. This, however, is not the efficiency in which the men in the plating industry are interested. These men are interested in the efficiency which affects the power bill, which is the overall efficiency of the equipment from the point where the meter is located, to the plating tank. Figure 7 shows the efficiency of a standard General Electric Plating Rectifier with its associated regulator, and shows an overall efficiency of approximately 72 per cent. No tank rheostats are required with a rectifier and consequently this is the overall efficiency from the point where it is connected to the A-C line to the plating tank.

The control unit or regulator controls the three-phase supply line inductively, without series ohmic resistors, and consequently the losses usually encountered with tank rheostats are eliminated. The importance of this can best be illustrated by a simple example. If a six-volt bus were brought into the plating room and a meter placed on it, so that cost of conversion were not a factor, and plating was being done at three volts by means of tank rheostats, the efficiency would be only 50 per cent. That is, there would be as much power dissipated in the resistance as actually used in the plating tank. It will be noted that this is lower than the overall efficiency of a rectifier installation which takes into account the rectifying equipment. From this, the conclusion can be drawn that the rectifier equipment is highly efficient.

A further requirement is that the equipment be economical in first cost, and the development of the UNIT Copper Oxide Rectifier package has been a major step in obtaining relatively low cost rectifiers for electroplating service. By standardizing on one or two sizes, and designing the units so that they may be operated

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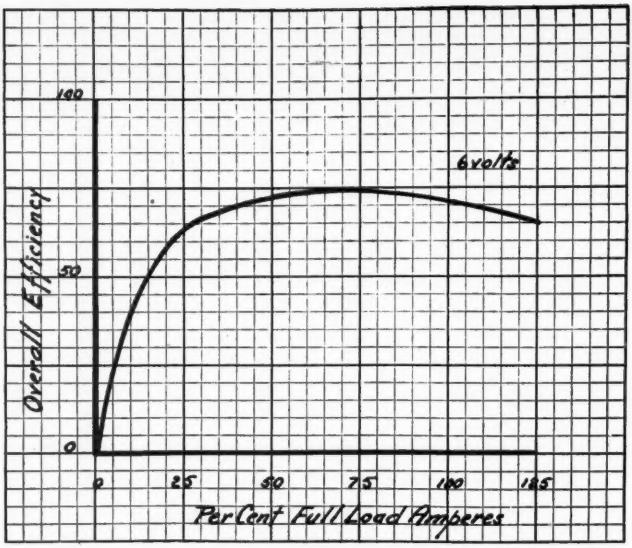

Fig. 7 — This graph shows the overall efficiency of a copper oxide rectifier. Data for this graph was obtained while one of the copper oxide rectifier units was operating at a plating tank.

in parallel, series, or series-parallel, and buildings the units in large quantities, many manufacturing economies are possible. These economies are naturally reflected in the selling prices of the units with a resultant low initial cost for rectifier equipment. Since installation is extremely simple, installation costs are also relatively low. No special foundations are required for supporting Copper Oxide Rectifiers, thus eliminating a major expense of installation. Maintenance costs, also, are extremely low, since there is nothing to wear out in the Copper Oxide Rectifier.

The Copper Oxide Rectifier is extremely easy to operate, as full operation is from the regulator. There are two dials on the regulator for controlling the output, one giving coarse and the other fine adjustment. It is merely necessary to twist these dials to obtain the full range of output.

One other requirement was that the equipment should offer some advantages over existing equipment, and unfortunately space does not permit a full and complete discussion of these advantages. An entirely different paper fully as long as this one, could be prepared on this one subject. However, since the main purpose of this paper is to help the men in the plating industry determine whether or not there is a place in the industry for rectifiers, it is essential that some of these advantages be pointed out.

The flexibility of UNIT installation, which was originated by the General Electric Company, is probably self-evident. UNIT installation brings to the plating room the advantages that were brought to the machine shop with individual control on each machine. The old time machine shop that was driven by a central power unit with its associated shafting, pulleys and belts is quite familiar, and it is well known that this type of machine shop is rapidly disappearing in favor of individual control on each machine. The advantages, economies, and safety factors that are gained in the machine shop are now well known, and these same advantages are available to the plating room with UNIT installation. UNIT installation, of course, can be obtained with motor generators as well as with rectifiers, but motor generators

do not lend themselves as readily to this type of installation.

Another advantage that should be mentioned is that of operating costs. The high overall efficiency and the fact that tank rheostats are not required are indicative of the savings made possible in operating costs.

Together with operating costs might also be included maintenance costs; and as has been pointed out, maintenance cost on rectifiers is practically negligible due to the fact that it is a static device. That is, there are no rotating parts, commutators or brushes that require frequent attention.

It seems essential that some mention be made regarding overload on rectifiers, since this is a question frequently brought up. In general, the rectifier manufacturer recommends that the load on the rectifiers shall not exceed the rating of the rectifier. If overload capacity is required, it seems more logical to obtain additional units. Wherever overload conditions are specified, it is usually for a period of two hours or more; and when a rectifier operates for two hours at any load, it is equivalent to continuous operation. Therefore, in order to build a rectifier with 25 per cent overload, it merely means that the nameplate rating will be actually 80 per cent of the full capacity of the rectifier. In order to take full advantage of the full capacity of the rectifier, it would seem advisable, therefore, to put the full rating on the nameplate.

To take a specific case, there is now available a 500-ampere 6-volt rectifier unit. If a rectifier with 25 per cent overload capacity is specified, this rectifier would be rated at 400 amperes, and the nameplate rating would be 400 amperes. However, it is actually a 500-ampere rectifier. Therefore, in order that the user may

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be able to use his rectifier continuously at the full rated output of it, it is advisable to rate the rectifier at 500 amperes without overload. If the customer wants 25 per cent overload, it is a simple matter to obtain an additional unit. Here again, the UNIT installation further proves its economy and this is just one other feature of UNIT installation.

Summarizing the foregoing, it is noted that there are certain requirements of any piece of apparatus that may be introduced into the plating industry. The Copper Oxide Rectifier meets these requirements. A summary of the requirements would be a statement to the effect that the Copper Oxide Rectifier should do a better job in a better way, or should do an equal job in a better way. It is not claimed that the Copper Oxide Rectifier will do a better job, but the analysis shown indicates that it will do an equal job more efficiently, at lower cost, and consequently, in a better way.

Oakite Compound No. 42. With equipment now being operated at full capacity in plants the nation over due to the speeded-up production schedules required to meet the demand for increased output, maintenance routine must also be handled on faster, more effective basis.

Of timely interest to metal producing and fabricating plants in this connection, is the revised third edition of an illustrated 20-page booklet recently issued by Oakite Products, Inc., 20 Thames St., New York City, describing improved, safe methods for quickly removing water scales, rust and similar deposits from over 29 different types of water-cooled or water-circulating processing and other equipment.

Concise data is given on Oakite Compound No. 32, a specially designed material which because of its high scale and rust removal properties and wide range of activity, helps eliminate the need of time-consuming mechanical methods for descaling equipment. Among the units discussed are surface and evaporative condensers; Diesel, gas and gasoline engine cooling systems; "lube" oil and jacket water coolers, feed water heats and similar heat exchangers; condensers of the shell-and-tube, double-pipe and vertical-open types; water-cooled air or gas compressors.

In addition, the booklet includes much helpful information on various other types of work where safe, fast, effective removal of scale or rust is essential in connection with equipment operation or for appearance. Copies free.

Twenty foot-candles of uniform fluorescent illumination, free from high spots and shadows, are provided inside the cars on this 750-ft. production line of the Seaman Body Division, Nash-Kelvinator Corporation, Milwaukee. Each of the 200 Westinghouse units uses two white 40-watt, 48-in. fluorescent lamps. Units are mounted 72 in. from the floor and are in staggered arrangement 54 in. apart, end-to-end.

(Photo Courtesy Westinghouse Electric & Manufacturing Co.)

ILG 64-Page Universal Blower Catalog and Data Book. A new 64-page combined catalog and engineering data book on Universal Blowers has just been announced by the Ilg Electric Ventilating Co. of Chicago, Illinois.

Colorfully printed and profusely illustrated, the book features Ilg's four lines of direct-connected and belted blowers, plus the two lines of volume blowers . . . the construction of the Ilg-built motor . . . advantages of the Ilg patented Variable Air Controller and Floated Drive . . . and the complete group of Marine blowers. Uses of each type, characteristic curves, dimensions and performance data are included. Then, as an extra service, fan performance laws, an altitude table, air friction and duct graphs, sample specifications and a chart of universal discharge arrangements have been reproduced.

While distribution of the manual is being restricted, qualified architects, engineers and contractors may receive a copy by calling the nearest Ilg branch or writing direct to the Ilg home office in Chicago.

Typical Examples of Goodrich Development in Rubber. A collection of 24 of its most notable industrial advertisements during 1940 and 1941 has recently been published by the mechanical division of The B. F. Goodrich Company, Akron, Ohio, under the title "Typical Examples of Goodrich Development in Rubber," the theme of the institutional campaign of which these advertisements have been a part.

Many of the advertisements tell the story of new and unusual uses of rubber to meet problems the company's research and development staffs, while others portray noteworthy achievements of some of the major items in the product line, such as conveyor belts, tank linings, hose, or Koroseal, the synthetic elastic which B. F. Goodrich laboratories created.

Each advertisement contains a striking illustration, with interest compelling headlines which lead the reader into the copy story. They were prepared by the Griswold-Eshleman Company, Cleveland, under the direction of H. E. Van Petten, advertising manager of the mechanical division. Copies of the booklet are now available upon request to the manufacturer.

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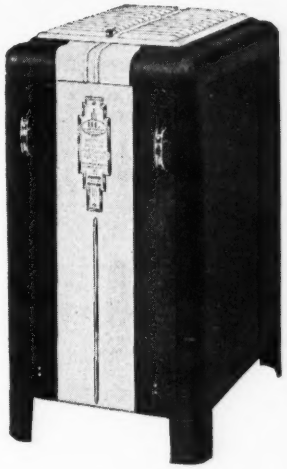

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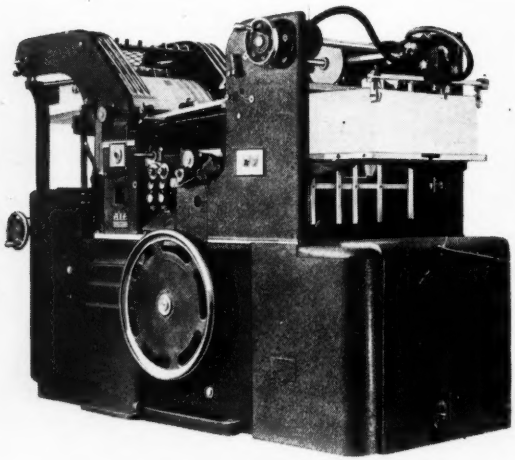
Putting on a Finish that can "Take It"

This article tells how American Type Founders, Inc., performs a complete finishing job prior to machining and assembly

FOR nearly five years, American Type Founders, Inc., Elizabeth, New Jersey, has applied Wrinkle Finish to its broad line of printing equipment. There is nothing unusual about this, for many manufacturers have standardized on Wrinkle Finish for as long a time or longer—but American Type Founders was among the first to discover that Wrinkle Finish made it possible to completely finish large castings before machining and assembly operations.

American Type Founders knew that the finishing of these parts as they came from the foundry and before they entered the machine shop would be speedier than finishing after machining or partial assembly. And with the finishing department at the head of the production line, finishing as a cause of bottlenecks could be checked off. The problem was, however, to find a finish that would stand up while going through the machine shop, so that as the units were completely assembled extensive touch-up could be eliminated. After considerable experimenting with various types of finishes and finishing methods, Wrinkle Finish provided the answer. Wrinkle was found easy to apply, it covered most surface irregularities present in castings and sheet metal parts, and it was extremely durable — durable to the point that even after successive machining operations and hazards of assembly, the necessity of touching-up



Headpiece — Hundreds of castings and sheet metal parts — all Wrinkle Finished — make up the completed Kelly Clipper.

Fig. 1—At ATF, flow of production starts in the finishing room. Here rough castings are being Wrinkle Finished. Castings are finished in either machine tool grey or black Wrinkle.

•

was a rarity rather than general practice.

In other words, by using Wrinkle Finish, American Type Founders was able to forget finishing problems at the very start of production. Masking and other requirements of conventional finishing methods became a thing of the past.

This does not suggest, however, that Wrinkle is a fool-proof finish. Quite to the contrary, Wrinkle Finish, like any industrial finish, must be handled carefully. In the hands of careless or inefficient spraymen, trouble is certain to appear, but with proper treatment Wrinkle will respond as no other finish will, giving the user economy, durability, and beauty.

Finishing at American Type Founders is simplicity itself, for for the use of Wrinkle has reduced this operation to a minimum of effort, time, and money. The accompanying photographs tell the story.

American Type Founders does not maintain a foundry or metal stamping department and, consequently, all castings and sheet metal parts are obtained from outside sources. By purchasing quality castings to begin with, ATF obtains obtains castings that are free

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Fig. 2—After Wrinkle is applied, the finish is baked in an electric oven heated to 250 deg. Wrinkle Finished castings require 1½ to 2 hours to bake out while sheet metal parts require only 45 minutes.

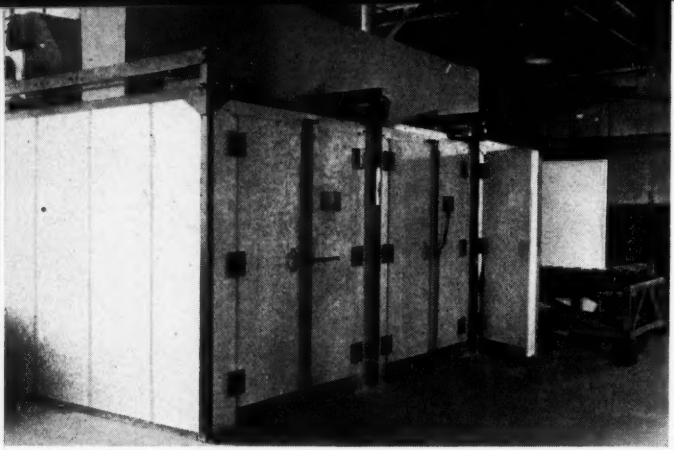

Fig. 3—A view of the three compartment oven in which the Wrinkle Finished workpieces are baked. All external steam heating is used for temperatures up to 250 deg. and internal electric heating elements for temperatures above this.

•

from excessive blow holes and other surface irregularities. However, as a matter of precaution each casting is given a quick inspection before Wrinkle Finish is applied, for once in a while a casting will require minor patching. Or, if the casting has remained out-of-doors any length of time, rust will have to be removed by a light scraping of steel wool. Beyond this, the only prefinishing operation is snagging. No provision for degreasing is made, as the castings are delivered comparatively free from shop dirt and grease.

Actual finishing begins as the casting or sheet metal parts are placed on a large worktable and rolled into the spray booth. Here, using either black or machine tool grey Wrinkle, all surfaces, inside and out, are given but one all-concealing coat. After spraying, the worktable is placed inside an electric oven where the Wrinkle Finished is baked at a temperature of 250 deg. Sheet metal parts bake out in 45 minutes while the castings are dried in 1½ to 2 hours. Thus the castings are completely finished and in the machine shop within 3 hours' time.

The machine shop is the real proving ground for the Wrinkle Finish. In the shop the Wrinkle Finished

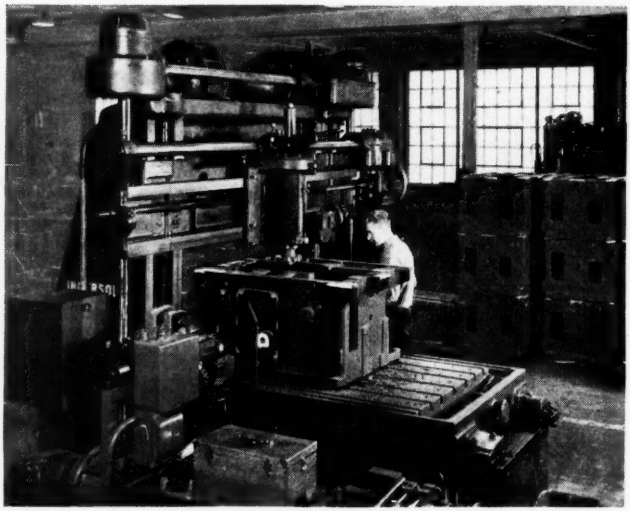

Fig. 4.—Largest casting ATF Wrinkle Finishes is this massive one-piece press base shown being machined. During machining operation, the Wrinkle Finish does not crack or chip off.

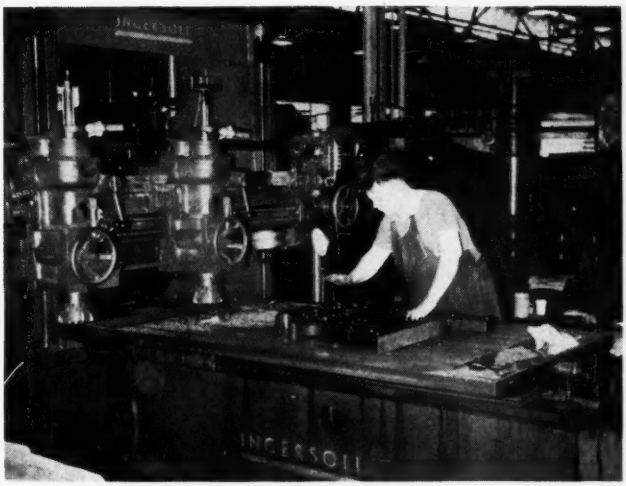

Fig. 5—Machining a small casting. Here again the ability of Wrinkle Finish to stand up under machine operations is demonstrated. Clamps and fixtures do not scratch or mar the finish.

•

castings receive no more care than unpainted castings would. Areas adjacent to those being machined do not crack or chip nor does clamping mar the finish.

After machining, the various parts are held in stock or delivered directly to an assembly line. Upon the completion of a Kelly Clipper press, original luster of the Wrinkle Finish is restored by wiping it free from shop

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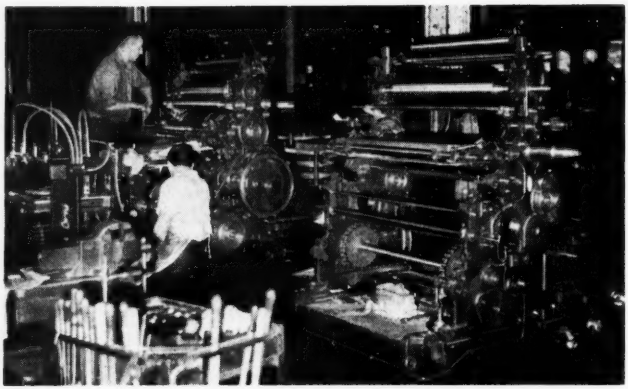


Fig. 6—No time is lost at the assembly as no further finishing or touch up of the Wrinkle is necessary after its initial application. Shop dirt and grease are wiped off prior to shipping.

dirt and grease with a cleaning solution.

The case for Wrinkle Finish does not end at American Type Founders. What is true at ATF is also true of every other Wrinkle Finish user depending upon the extent and purpose of its application. Summing up the situation we find that American Type Founders has been able to simplify and speed production, but more importantly they have reduced overhead in the finishing room by a ratio of 4 to 1 or 75 per cent . . . and this shows up in the final analysis as a saving of $25.00 per unit.

Inspection of Metals. A new book, described as a most complete manual on the inspection of metals, and written by a recognized authority in the metallurgical field to fill a definite need of the defense program, is being published by the American Society for Metals, 7301 Euclid Ave., Cleveland, Ohio, as a contribution to a speedier and more effective rearming of the nation. The book will be sold at cost.

"Inspection of Metals" is by Harry B. Pulsifer, metallurgical engineer with the American Metal Treating Company and consulting metallurgist with Ferry Cap and Set Screw Company, Cleveland; formerly assistant professor of metallurgy, Lehigh University; in charge of development laboratory, Beryllium Corporation of America; director of district laboratory and works metallurgist, American Steel and Wire Company, Cleveland.

Included among the topics covered by the book are—"Ideals in Steel Making"; "Surface Inspection"; "Tensile Testing Including Shear"; "Microscopic Structures and Patterns"; "Coatings and Corrosion Testing" and "Impact Fatigue and Creep Testing."

"Inspection of Metals," a stripped-for-action handbook, covering the whole field of the testing of metals for ordnance, armament, and other phases of the national defense effort, contains only essentials and is written in a style comprehensible to the hastily trained emergency worker as well as the veteran metals man.

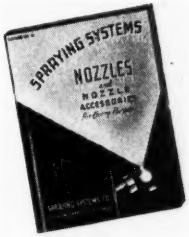
Following a review of an advanced copy of Dr. Pulsifer's work, the office of the Chief of Ordnance, War Department, warmly praised the book and commended the efforts of Dr. Pulsifer and the American Society for Metals in publishing the book as a worthy public service.

Inasmuch as the book was written and published in the interests of national defense and those so engaged, it has been made available at the cost of production—$1.00, and may be obtained from the American Society for Metals.

Goodrich Type RO Vulcanizer Catalog. A new catalog section on its Type RO portable vulcanizer for repairing the covers of conveyor belting, recently introduced, is now being issued by The B. F. Goodrich Company, Akron, Ohio.

The catalog section describes the vulcanizer, points out the need that exists for such equipment to permit speedy repair of minor cuts and gouges in a belt's rubber cover, which if disregarded might allow entry of moisture and abrasive material into the fabric plies, tending to weaken them.

Spraying Systems Catalog No. 21. A catalog designated as No. 21 is now being issued by Spraying Systems Co., 4015-21 W. Lake St., Chicago, Ill. This



Spraying Systems Catalog No. 21

1941 catalog describes and illustrates a complete line of spray nozzles for all industrial uses and contains many useful performance table and data sheets.

A copy will be sent free upon request.

Westinghouse Materials Handling Equipment Catalog. For use in industrial plants, electric motors and controls for cranes, hoists, and gantry bridges are described in a new 20-page booklet announced by Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pennsylvania.

Features of a.c. and d.c. motors up to 600 h.p. for typical materials handling operations are discussed with a note on gear motor applications. Controllers, protective devices, and methods of motor braking are described and illustrated.

A two-page application chart facilitates the selection of motors and control for typical materials handling operations as found in steel mills, central stations, construction projects, and industrial plants.

A copy of booklet B-2264 may be secured from department 7-N-20, Westinghouse Electric and Manufacturing Company.

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Barrel Finishing of

The Application of Wood Forms In Barrel Finishing Practice.

By H. LEROY BEAVER

Barrel Finishing Consultant
Lansdale, Pennsylvania

WE have previously in this series discussed the use of barrel finishing materials made from wood where wood blocks were added to a conventional burnishing mass for the hoped for purpose of preventing nicking of the parts in process by acting as a cushioning medium. These wood parts being generally made from maple were of far less specific gravity than that of either the parts being finished or the steel materials composing the mass, hence they floated on top of the mass and their value was largely in the state of mind of the operator of the barrel, rather than in their performing any actually useful service. So much for the use of wood particles in combination with a steel mass of regular burnishing materials.

Mr. H. Leroy Beaver, author of this series, will be present at the Products Finishing Booth F-57 at the National Metal Congress and Exposition, Philadelphia, Pa., during the week October 20 to 24 to meet his many readers and discuss with them personally their barrel finishing problems.

Following this, the second discussion of the use of wood forms in a burnishing mass was in connection with the use of wood balls, blocks, and other forms combined in a mass used in the barrel finishing of plastics as well as in the dry method of finishing light gauge metal parts, and it was here explained that such wood parts were not expected to produce any finishing action but were added to the mass principally to act as separators and to keep the work from bunching in the mass, a condition that may occur more readily in dry barrel finishing than in the customary operation where steel burnishing materials are used in conjunction with a soap water lubricant.

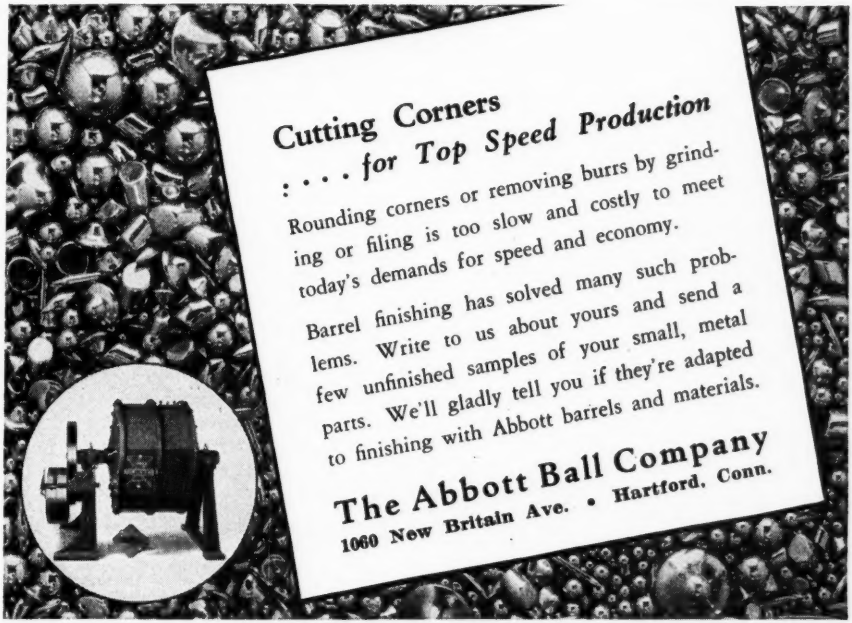
In the long category of parts that may be acceptably finished by barrel method, there is a range in specific gravity which might be classed as running from around 90 to 140 s.g., and the problem has been to seek out some form of material that might be successfully applied as a finishing medium for parts of this character.

Hence this discussion will, in itself, be something of a report of the development of a research in barrel finishing procedure.

g of Metal Products

Many materials were checked and considered for this range of applications, but finally the choice came down to one wood material officially known as Guaici Lignum of Guaicum Wood. This term as it stands might mean little to the average reader until we explain that while this is the official name of the tree, the wood derived from this tree is commercially and commonly known as "lignum vitae." So in order that the whole research trend will be seen, we will first describe the tree and its lumber and then show its application to barrel finishing practice.

Guaicum Officianale is a large tree of very slow growth, when of full size it may run 40 to 60 feet high with a trunk four to five feet in circumference. It grows throughout tropical America, in the Greater and Lesser Antilles, Cuba and Haiti and some varieties are also found in Florida. Much of the supply used in the United States however comes from Brazil, Venezuela and Colombia. As imported, Guaic wood is in the form of logs or billets covered with thick gray bark which presents on its inner surface, and upon its edges when broken numerous shiny crystalline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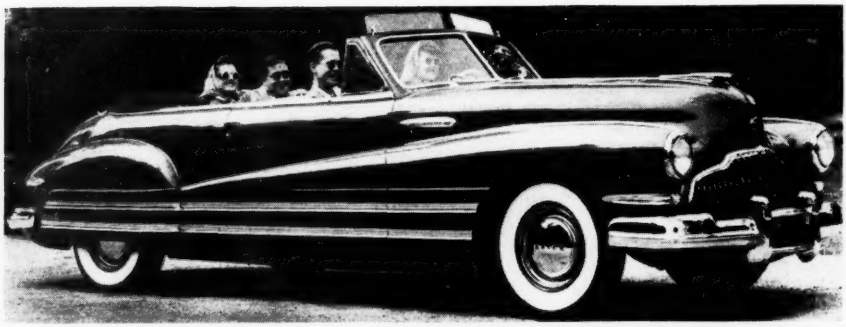
particles. These were at one time supposed to be benzoic acid or a resinous exudation from the vessels of the plant, but were later determined to be the crystals of calcium sulphate.

The billets are used by turners for the fabrication of many forms of wood parts that are required to withstand hard usage, and as an illustration, the wood wheels in the commonly known furniture casters are generally turned from this material. In addition to this, thousands of small spools of a wide variety of sizes are processed, as well as bushings for small shafts, and fortunately for our purpose the same forms can also be used in barrel finishing procedure. Due to its extreme hardness and density its name "lignum vitae" undoubtedly was originated due to its durable properties.

Lignum Vitae is hard and heavy. The outer or yellow layer of sapwood is a pale yellow in color and is devoid of resin; the inner or heartwood, by far the larger proportion of the trunk is a dark greenish brown and **contains in its pores a full 26 per cent of resin and has a specific gravity of 1.333 and therefore sinks in water** on which however the light yellow sapwood layer will float. Owing to the diagonal and oblique arrangement of the successive layers of its fiber, the wood cannot be split.

Inasmuch as we are interested only in the inner or heartwood of the tree, we can, even when the material is handled in sawdust form, easily separate the outer from the inner layers by simply agitating the sawdust in a solution of sodium chloride (1 in 3). The heavy dark, greenish brown dense portion of the sawdust will sink to the bottom of the vessel after which the pale yellow or sap layer can be skimmed off and the heavy portion which sinks can be reclaimed by simply siphoning off the water and reclaiming the dark portion on the bottom of the container.

The resin of which we have previously noted a content of 26 per cent is known commercially as gum guaiac. It exists in the tree as a physiological product filling in the tissues of the wood. When the gum itself is desired it may be obtained in several ways, the most simple being by spontaneous exudation or by incisions made in the trunk. Another method is by sawing the wood into billets about three feet long, boring them longitudinally with an auger, then placing one end of the billet in the fire and collecting in a calabash the melted guaiac which flows out



Fully streamlined, the 1942 Series 70 Roadmaster convertible coupe typifies the advanced styling of the new Buick models. Wide, low radiator grille, heavy bumpers, curved to protect fenders both front and rear, are among design features. The bodies and fenders of the 1942 models are finished in Duco Lacquer.

through the hole in the opposite end. The wood may be also boiled in a solution of common salt, skimming off the gum as it arises to the top.

This 26 per cent of gum derived from the wood has a melting point at between 85 and 90 degrees C. or 185 to 194 degrees F. It is only very slowly soluble in water, if at all, but is almost immediately soluble in even mild alkaline solutions.

To give the reader some easily illustrated idea of the extent of the variation in density of lignum vitae as compared with other wood mediums previously used in barrel finishing procedure we would say that an even bushel of maple sawdust will weigh approximately 24 pounds while a bushel of lignum vitae sawdust will average about 65 pounds in weight, and so whether used in the form of blocks or other formed pieces and either with or without the sawdust filler, it will be seen that the weight factor to be used in obtaining pressure for the barrel finishing operation is almost three times as great as can be obtained when maple or other hardwood parts or sawdust is used.

Now in applying this material to barrel finishing procedure, the operation is quite the same as that used when steel burnishing materials are the medium. On the range of parts to be finished of the specific gravities as previously noted, it can easily be seen that no difficulty will be experienced in maintaining the parts to be finished within the burnishing mass because the specific gravity ranges are along the same planes, and thus the parts will not flow to the surface as they would with steel burnishing materials or sink to the bottom of the mass and ride the periphery of the barrel as they would do if the lighter woods such as maple were attempted to be used.

As a lubricant, soap and water may be used exactly the same as in burnishing or barrel finishing with

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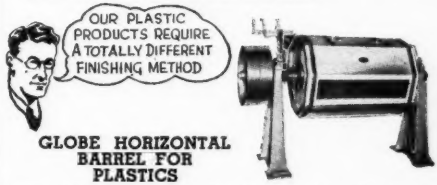

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steel materials. Naturally, the parts should be very clean before placing in the barrel and indeed all of the steps to secure cleanliness as previously noted in connection with steel burnishing material should be utilized just as fully when wood material is used.

In building up the burnishing mass itself it should consist of equal parts of formed pieces and sawdust, separated first, of course, by the method previously described. The idea being to form a compact mass of wood material that will all remain under water. The same loading ratio may be used, that is, two parts of the wood mass to one part of the parts to be finished, this proportion being determined by bulk and not by weight. Water is added to just the surface level of the mass but less soap is required than in steel burnishing material application perhaps for the reason that a part of the constituent of the lignum vitae itself is a form of saponin which will combine with whatever soap is used to form a quite heavy suds to support defflocculation. Instead of using the generally accepted 42 to 43 titer soap, a lighter one such as an oil base soap with a titer of around 18 or 19 will be found to function well.

We have previously noted that the melting point of the 26 per cent gum content of this wood will be found between 185 degrees to 194 degrees Fahrenheit, so obviously the water used to charge the barrel should be lower than the melting point of the gum and this is true also of the rinse water used after the completion of the barreling operation. We have found the best practice to be simply to rinse the parts as they come from the barrel in the conventional way, then give them a quick dip in an alkaline cleaner for the purpose of dissolving any slight film of gum that might deposit on the surface, and this to be followed by a clear rinse. We have never noted any film on the parts following such treatment, even under simple magnification, and parts treated in this manner preliminary to plating should present a clean clear surface and provide for excellent adhesion of the plate. The operation on parts following the plating is the same as on the operations preceding plating.

Naturally the barrel operating time will be longer when this type of wood material is used for the weight carrying medium. The specific gravity of the average steel burnishing material mass is 4.9 while that of lignum vitae formed of a combination of formed pieces and sawdust filler will be approximately 1.333.

With the mass being so much lighter, it is not necessary to use as rugged barrels for barrel finishing with lignum vitae as would be required with steel burnishing materials, indeed the same type and weight of barrels used in the various dry finishing processes, provided they are properly gasketed to make them water tight, will function very well, but this wood material may also be used in the regulation types of burnishing barrels, either of the high and narrow or long and narrow varieties.

In connection with the rinsing, the barrel should be dumped in such a way that a baffle can be set in the unloading pan to temporarily check the flow of the sawdust content of the burnishing mass from rushing too rapidly toward the drain and a finer screen should, of course, be used over the drain pipe to prevent the loss of the finer particles.

We had planned originally to use some illustrations in connection with this discussion which, of course, covers the application of the material when used as a substitute burnishing material on light parts with a soapy water lubricant. The part of the dis-

cussion covering such wet use is contained in this paper, but space does not permit the discussion of the use of this material in its dry state, and the very interesting method of preparing this material for dry operation and the field of its applications will be covered in the series in the November issue.

Ameripol D Synthetic Rubber. Featured by four tables, which contain data enough to answer almost any question on the subject, The B. F. Goodrich Company has just published an eight-page catalog section on its Ameripol D synthetic rubber, used in making mechanical rubber products.

First of the tables compares the properties of Ameripol in 33 specific respects starting with "workability" and ending with "resistance to paint and ink dryers" with natural rubber and two other types of synthetic rubber, giving the rating of each in the various categories.

The second table lists the properties of typical Ameripol D vulcanized compounds, including Shore durometer hardness, percentage of elongation at break, modulus at 300 per cent elongation, ultimate tensile strength, rebound elasticity, compression set and abrasion resistance index. It also lists the results on each type of compound of 48 hours immersion in fluids which have a solvenizing effect on natural rubber, ranging from hexane to light penetrating oil.

Table three gives the per cent volume increase after 48 hours' immersion of natural rubber and two other types of synthetic rubber, as compared to Ameripol D, while the fourth table is a rough guide to determine the service where the use of Ameripol D is practical.

Plentifully illustrated with pictures showing mechanical rubber products made with Ameripol D, the folder discusses in detail its properties, hardness, tensile strength, elongation, weight, color, odor and taste, elasticity and permanent set, tear and abrasion resistance, and resistance to flexing, oils and solvents and heat.

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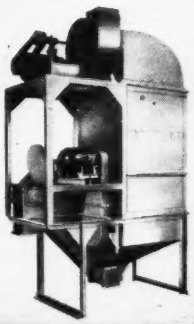

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Modern Gold Plating

By JOSEPH B. KUSHNER, CH.E.
Metal Finishing Consultant
New York City

DURING the short space of the past two years a great deal of attention and interest has been focused by the novelty and jewelry manufacturers on the gold plating of plastic items. Brooches, buckles, pendants, bracelets, buttons and ear rings, either molded or machined, of various synthetic plastic compositions are now being plated to resemble solid gold. These items look as though they are made of solid metal, yet the have the virtue of being amazingly light in weight.

Outside of the novelty of the idea and the obvious advantage of light weight, another advantage of the process, now enormously important because of the present critical situation, is the fact that no basis metal is required. Available stocks of white metal alloys commonly used in rubber and bronze mold casting are rapidly being depleted or withdrawn from non defense uses and brass and nickel silver have been strapped up tighter than a cotton bale by priorities. This means the novelty manufacturer who is not well "heeled" with metal stocks for some time to come, will have to start looking around if he is to continue in business. As was pointed out in a previous article, we have plenty of gold and silver. If plastics remain available, then the gold plating of them is a way out, a way for staying in business when the boys who depend on white metal have to shut the doors and take down the shingle.

For this reason, interest in the subject has reached the boiling point and we have literally been swamped with requests for information on the gold plating of plastics. In view of these many requests we are going to give a descriptive outline of the methods open to the novelty manufacturer for the plating of plastics. In discussing the methods we are going to confine ourselves to the relatively non-porous and impervious synthetic plastic materials known under the trade names of Bakelite, Catalin, Beetle, Tenite, and so forth. Porous substances, such as wood, plaster and leather, require special pore filling treatments before they can be metallized and will not be discussed here.

The basic steps in gold plating plastics are:

1. The plastic objects are cleaned.
2. A preliminary or initial electrically conductive coating is put on.
3. A solid metal surface is built up on the conductive objects by plating them in an acid copper sulphate bath.
4. The objects after suitable polishing treatment, are gold plated.

Part 14

The essential and most difficult step in the process is number 2, getting a preliminary conductive coating on the work. For this step there is a choice of methods that give rise to the various techniques we intend to describe. All depend either on the chemical or physical reduction of a metal (usually silver) or the adherence of a conducting powder coating such as copper or graphite, to the objects.

I. Reduction Methods

A. Chemical Reduction Methods
   1. Reduction by inorganic compounds.
   2. Reduction by organic compounds.
      a. simple reduction.
      b. Direct reduction on plastic.
      c. Spray reduction.
      d. Etching, "swelling" or sandblasting plus reduction.

B. Physical Reduction Methods
   1. Metal spraying.
      a. Wire.
      b. Powder.
   2. Cathode sputtering.
   3. Metal evaporation.

II. Conducting Powder Methods

1. Gutta percha solution and bronze powder.
3. Wax and graphite.
3. Shellac and/or lacquer plus copper powder.
   a. Dipping methods.
   b. Spraying methods.
   c. Barrel methods.

III. Miscellaneous Methods

1. Formation of silver sulphide film.

From a historical standpoint the chemical reduction methods were probably the earliest methods used to produce a thin metallic film on nonconductors for the purpose of plating. Some of the first text books on the subject of plating mention the use of phosporus in reducing silver from its compounds to form a silver mirror on the object to be plated. The metal that is reduced, naturally, does not have to be silver, but it has been found the most convenient metal to use for the purpose. Copper can and has been used but a difficult technique is involved and other metals such as

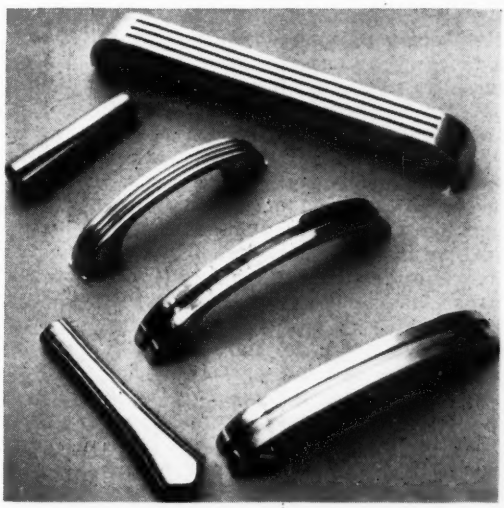

Fig. 1—Gold and silver plated plastic handles.

platinum and gold appear far too costly at the moment to be used this way. The subject is one that is deserving of further research and study.

Chemical Reduction Methods

1. Reduction by phosphorus and inorganic compounds.

This method, which we describe for its historic importance only is definitely **not a recommended one** and is in fact, quite dangerous to use. Essentially, it is this: The work to be plated is dipped into a solution of white phosphorus in carbon disulphide (several other solvents almost equally unpleasant or dangerous are also available) and permitted to remain in it for a few moments. The work is then removed and held over the container of solution until the carbon disulphide evaporates. This is made visible by the smoking of the phosphorus which starts to fume the moment the last bit of solvent has evaporated. At this moment the work is dipped into a specially prepared silver nitrate solution. The phosphorus layer on the objects causes some silver to be reduced on them and a dark stained mirror of silver is produced on the work. This film of silver is of sufficient conductivity to permit subsequent plating in an acid copper bath.

Fig. 2—Gold plated plastic ornaments.

As can be imagined, the method is quite dangerous because of the fire hazard involved (white phosphorus is the basic ingredient of the incendiary bombs that fall on the capitals of Europe every night) and the toxicity of the available solvents. Our personal experience with the method came to an abrupt end when a drop of the phosphorus solution fell by accident on a piece of highly inflammable material and we received a neat hair singe without benefit of a tonsorial artist. In consequence thereof we strongly recommend that you stay away from the method.

Other inorganic reducers have been recommended by some of the writers on the subject, one of the more common ones being a solution of iron nitrate. The work is dipped into such a solution and then after drying is dipped into a silver nitrate solution. This cycle is repeated until a greyish coating of silver forms on the work. The method was tried rather unsuccessfully by the writer, so we do not recommend it here but it does appear as though some other inorganic reducing agents offer distinct possibilities in this direction.

2. Reduction by organic compounds.

The standard method for the production of a silver conducting film on plastics is by the use of organic reducing agents on ammonical solution of silver salts. A number of reagents have been described in the literature, among which are formaldehyde, rochelle salts, sugar, hydroquinone and patented complex organic compounds whose names are unpronounceable. Of all these reducing compounds, time and experience has

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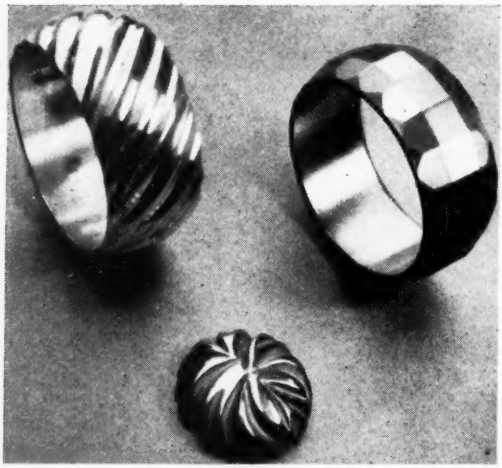

Fig. 3—Gold plated plastic bracelets.

shown that rochelle salts and the Brashear reducer (sugar plus nitric) are probably the best.

The usual method for the preparation of the silver solution is to dissolve c.p. silver nitrate in distilled water and a sufficient quantity of ammonia is added to almost completely redissolve the precipitate which first forms. The solution takes on a straw like color when properly prepared.

In use, the work, which has been thoroughly cleaned and rinsed as described in a later paragraph, is placed in a trough type tank and a fresh mixture of the reducer and the silver solution is poured in, in sufficient volume to cover the work. After a few moments a thin film of silver is precipitated on the work and if a slight rocking motion is used, all surfaces will become coated with this film. After the silver film has formed, the objects are removed and carefully rinsed and are then ready for the acid copper plating operation. This basic technique can also be applied in a special type of barrel operation on small items.

With some plastic materials it is possible to precipitate a film of silver directly on the work by immersing the work in a heated silver solution, without the use of external reducers. The method is only successful, however, with certain plastics of the Bakelite series, that is, phenol formaldehyde condensation products, because there is a residual amount of formaldehyde present in the plastic surface and therefore direct reduction can take place. It is possible that this technique can be enlarged upon by incorporating a compatible reducing agent into the raw material mix that is being fed to the molds. This would result in a considerable simplification of the process.

There appeared in the patent literature some while back a method for the production of a silver mirror by spraying. The object to be mirrored is sprayed by a specially designed gun which permits the two solutions (silver solution and a reducing solution) to merge in midair, and on reaching the object a thin film of reduced silver is deposited. Nothing further has been heard of this method and we know of no one using it, though it would also appear to have excellent possibilities in the metallizing of plastics.

The adhesion of the thin silver film produced by these reduction methods to the plastic surface, no doubt brought about by molecular forces, is in many cases quite strong, but the stresses and strains induced in it by subsequent electrodeposition of other metals may cause the bond to fail in certain applications where the copper

plate does not completely surround the work mechanically. For this reason methods have been devised to obtain firmer anchorage and bonding of the initial silver surface to the plastic object. These methods involve either chemical roughening (swelling or etching) or mechanical roughening (sandblasting, rolling, pumicing) before the silver coating is put on.

Several chemical roughening methods have been proposed and patented. The essential point is that they assert a dissolving action on the plastic of which the work is made. The common plastics that are encountered are the phenol-formaldehydes (Bakelite and Catalin), the cellulose acetates (Tenite), the urea - formaldehydes, (Beetle) and the cellulose nitrates (celluloid), and each type usually requires a specific treatment.

For cellulose esters, for example, an acetone solution may be used either alone or in conjunction with other solvents. A solution containing potassium bichromate and sulphuric acid has been patented for the same purpose. Solutions of hydroquinone have also been suggested for swelling urea and casein plastics, though in this case it may be a question of simple absorption on the plastic surface, the residual hydroquinone permitting easy reduction of the silver on the surface. Occasionally, if care is used, an ordinary bright dip will also be found good for swelling plastic surfaces and strong caustic solutions are sometimes utilized for the same purpose. Experiment can prove which method is particularly suited to an individual case.

The plastic surfaces can be mechanically roughened if desired by either sand blasting or sand rolling or pumicing. In any case, too much roughening is to be avoided, as it will tend to give rise to that unwanted plating effect known as "orange peel."

The typical sequence of operations after the plastic surface has been

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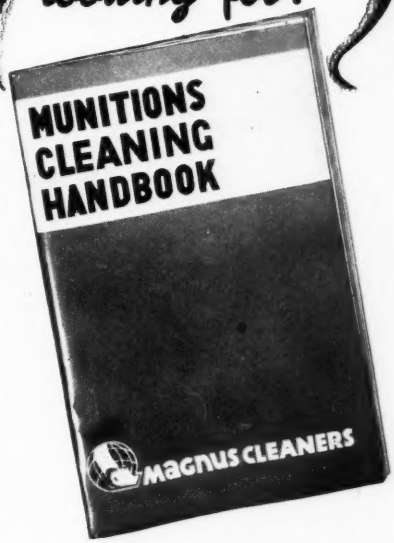

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suitably roughened is something as follows:

1. The work is cleaned by dipping in a mild alkaline cleaner followed by a thorough rinse, a nitric acid dip and another thorough rinse.

2. The work is dipped into a slurry of stannous chloride in water and rinsed in clear water.

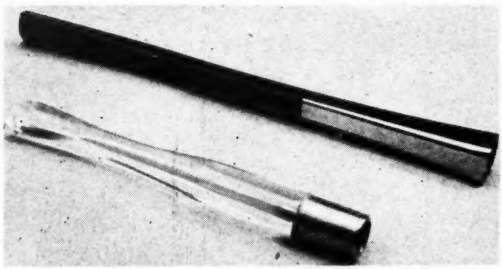

Fig. 4—Gold plated plastic cigarette holders.

3. The work is treated in the silver reducing bath. (This may be done in trough or barrel, depending on the nature of the work.)

The stannous chloride treatment is sometimes omitted, though most platers of plastics still use it, for it appears that an extremely low concentration of tin ions on the surface of the work, such as would be brought about by dipping and rinsing as described, is conducive to the rapid and uniform reduction of the silver salt.

Physical Reduction Methods

Metal Spraying.

By this method molten metal is atomized and sprayed onto an object from a specially constructed and designed spray gun. The metal used is usually a low melting point alloy which is fed to the pistol in wire or powder form, where it is heated and sprayed out. The molten metal solidifies at once on the cool object and forms a continuous layer of metal on it. By revolving the work as in spray lacquering, a surface coating of metal can be built up to any desired thickness. The work to be metallized this way must be previously sandblasted to insure adequate anchorage for the metal.

The particular difficulty of the method is that the metal deposit tends to be granular and sandy. This is due to the fact that the gun must be held at a distance from the work because heat from the gun may tend to decompose or deform the plastic material used. This being so the metal particles are partially cooled and solidified by the air over the longer path traversed and they pile up in a granular fashion on the work. It is claimed, however, that the newly designed guns overcome this defect to a large extent. If this is the case, the method is undoubtedly acceptable for certain classes of production work, although there still remains the problem of getting the low temperature melting point alloys with which to feed the gun.

Cathode Sputtering and Metal Evaporation.

These two methods are quite impractical for use in the plastics field, but they are described because of their interesting features.

In cathode sputtering which is used to some extent in the production of metal stampers from master recordings, the freshly cut platter is placed in a high vacuum chamber with a gold anode and a high potential, in the order of many thousand volts, is placed between them. Atoms of gold are literally torn out of the anode and deposited on the disc. After a layer of gold several molecules thick has been built up this way on the platter, it is removed from the vacuum chamber and is plated in an acid

copper bath according to the customary techniques used in the record making industry.

In the metal evaporation method, the metal, which can be gold or silver, is heated to incandescence in a vacuum chamber. The material to be metallized rests above the incandescent filament in the chamber. The metal vaporizes and condenses on the cool object, forming a thin film of metal on it. As can be realized at once, both this method and the sputtering method are completely impractical for production work on plastics. However, both of these methods have been used for coating cellophane to form tinsel wrapping paper and for the coating of fabrics.

Conducting Powder Methods

These methods are very frequently used in the production plating of plastic objects, as it is generally simple to get good results. The main idea of the method is to coat the plastic item with an adhesive material that will act as a good bond coat between the plastic and the conducting powder. There are a number of variations of the method but the fundamental principle remains the same. For example, the work may be dipped into a benzol solution of gutta percha, then after the gutta percha becomes tacky, fine copper powder is brushed on.

Another method is to dip the object in molten wax or a solution of wax in an organic solvent, then follow by brushing with graphite. It is possible in certain cases because of the extreme fineness of the graphite to get the graphite to stick to a surface without any adhesive film between.

Another method is to dip the work in a thin shellac solution and apply fine copper powder when the shellac becomes sticky either by a brush or

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by spray. The spray method is preferable because the copper powder does not flow well under a brush over a shellacked surface.

Still another method used, is to spray the plastic items directly with a suspension of copper powder in a lacquer base, or in another variation, the work if small is lacquered with bronze powder in a barreling operation and is then centrifuge or screen dried.

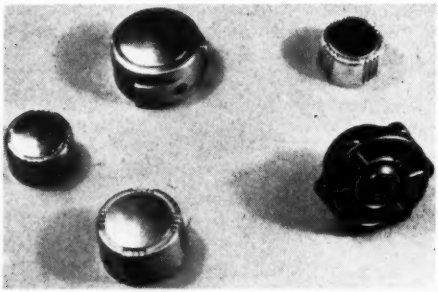

Fig. 5—Gold plated plastic knobs.

Miscellaneous Methods

The silver sulphide method.

With this technique, silver salts are incorporated in an adhesive base and the work is dipped or sprayed with the mixture. Following this, the work is exposed to an atmosphere of hydrogen sulphide which converts the silver salt in the film to silver sulphide, which is sufficiently conducting to be plated in an acid copper bath.

As was mentioned at the beginning, after the preliminary conductive film is placed on the work, the work is plated in an acid copper bath until a substantial coating of solid metal has been built up. The composition of the plating baths for this purpose usually run about 20-40 oz. per gallon of copper sulphate and 2-6 oz. per gallon of sulphuric acid. Care must be taken in the plating operation, otherwise difficulties will crop up. Poor and uneven distribution of the copper deposit will occur where a copper powder coating has been used, particularly if the copper powder has not been degreased or cleaned with a solvent like carbon tetrachloride or ether before use (the highly comminuted metal powders always carry a considerable amount of grease). Even where clean copper powder has been used the deposit will usually start at the point of electrical contact with the cathode and gradually bridge its way until the whole object is covered. To overcome this to some extent, it is customary to dip work that has been treated with copper powder into a solution of silver cyanide low in free cyanide. This causes the formation of a silver coating on the copper powder by displacement and improves the conductivity of the coating.

After a fairly heavy deposit of acid copper has been put on the work either in a plating bath or barrel the work is removed and is usually polished by a tumbling operation with steel balls. It is important that the bond of the copper to the plastic item be strong if the tumbling operation is to be successful; a poor bond shows itself immediately by raising blisters on the work. To overcome this, where bonding is definitely known to be poor, an extra heavy coating of copper is put on which resists blistering because of sheer mechanical strength.

Once the work is copper plated and polished it can be given a light deposit of bright nickel and a flash of gold. In this way the use of a protective lacquer is avoided. Otherwise, the work after copper plating and polishing, is plated directly in a gold plating bath low in free cyanide and low in temperature. After gold plating on the copper base, the work is

lacquered and this completes the job.

In looking over all the methods described for the production of the first conductive coat we can summarize the advantage of the silver mirror type of coating over the conductive powder coating in this way: The silver mirror will give a sharper reproduction of the contours of the object because the volume and flow of the adhesive used with the conducting powder is such as to tend to fill in crevices and openings in the work. However, in many cases sharp reproduction is neither necessary nor desirable. A further advantage of the silver coating process is that the silver film has a much higher conductivity and therefore permits more uniform subsequent deposits of metal. A disadvantage of the silver mirror method in favor of the powder coating method is the fact that if the plastic surface has not been cleaned properly and (or) swelled, the adherence of the silver film may not be so great as the adherence of the powder binder.

All the methods described require that the first conductive film be plated in an acid copper bath because the acid copper bath is a type of solution that is least liable to destroy the conductive coating before the plate can be formed. This is in the main a drawback because even though copper salts can be obtained without much trouble, it is conceivable that they will be withdrawn from non-defense uses. We must, therefore, prepare to deposit silver on the work from a non-cyanide bath, as the first solid coating. Failing this, it may be possible to eliminate the plating operation altogether and deposit a gold mirror directly on the plastic by making use of some of the organic gold complexes described by Gibson.

Photographs of gold plated plastic items courtesy of Metaplast Inc.

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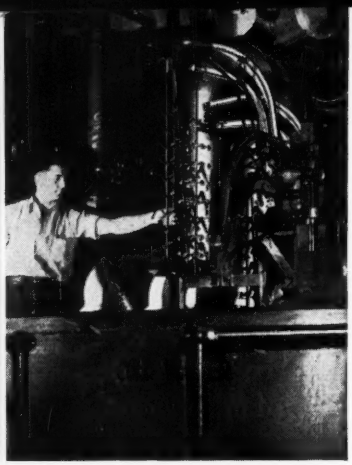

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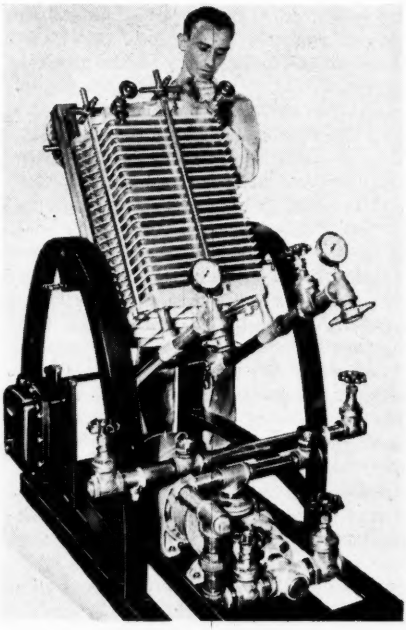
The Seitz Flexmaster is balanced on an axis on a sturdy stand, swings easily, and locks in either horizontal or vertical position. Loading of the filter is started in the horizontal position and the plates are slid apart. The sheet, filter paper, cloth, and so on, are slipped and aligned over two sleeves that connect the discharge channels of the plates, and the entire unit is solidly fastened.

The Flexmaster is then swiveled into vertical position. The feed and discharge lines are connected tightly by means of two special unions. Setting is then started by using a pump and mixing tank and recirculating the filter aid such as diatomaceous earth, asbestos, and so on, until a precoat is deposited on the back-up sheet, paper, cloth, or screen. The run begins with the manipulation of the valves.

The Seitz Flexmaster Filter has two



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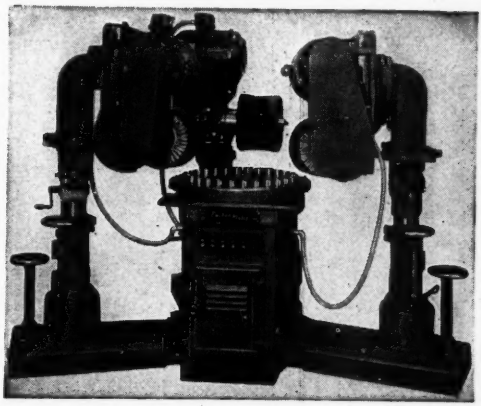

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Cleaning of the Seitz Flexmaster is said to be quick and easy. The unit is tilted back to horizontal position, the plates parted and the spent layers are stripped into the drip pan which is supplied with the filter. The Seitz Flexmaster can be constructed of any material for specific operating requirements. These materials include tinned bronze, iron, stainless steel, Monel, nickel, and so on. The stand and base of the unit are constructed of cast iron and welded steel.

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Carson Electronic Micrometer

Model L, Carson Electronic Micrometer for making precision measurements without pressure on soft, flexible, or compressible materials is now being marketed by Instrument Specialties Company, Inc., 233 Bergen Blvd., Little Falls, N. J. This instrument is said to measure the thickness of paint films accurately to 0.0001 inch.

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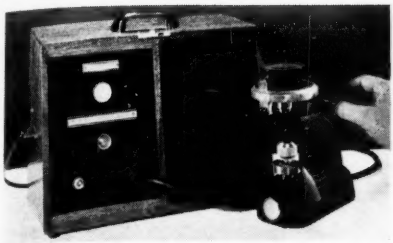

Carson Electronic Micrometer

Carson Electronic Micrometer is said to make thickness measurements on soft materials as accurately as on hard metal parts. The piece to be measured is placed between the jaws of the instrument and the dial rotated to the reading point as indicated by lamps in the instrument base and on the control panel. The instrument is said to be as rapid as a hand micrometer but independent of the operator, since electronic tubes do the deciding. The electronic circuit gives a positive indicator before any force is exerted on the work by the micrometer spindle.

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Sprodomine G and BM

Sprodomine barrel finishing compounds designated as G and BM have been placed on the market by Specialty Products Company, Inc., 190 Warren St., Jersey City, New Jersey.

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Operation of the Kocour pH Meter is said to be simplicity itself. One of the electrode tubes is filled with buffer solution and the other filled with the solution to be tested. A small amount of quinhydrone is added to each of the tubes connected with a piece of bridge paper. Knobs "A" and "B" are turned

Kocour pH Meter

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"Fingerless" Glove

ators who must have complete freedom of the fingers has been placed on the market by Industrial Gloves Company, 722 Garfield Blvd., Danville, Ill. "Touch" to sort or pick up sheets or small parts is provided by means of the Fingerless Glove. At the same time, complete protection is provided for the palm of the hand and between thumb and forefinger.

In addition to being made of chrome tanned long wearing split leathers, the glove is steel stitched which is said to eliminate the possibility of ripping, an expensive and dangerous weakness in makeshift fingerless gloves. The glove may be worn over the bare hand or pulled over a lightweight glove. It may be obtained in three sizes, small for women operators, medium and large for men.

Hydrowax Liquid N Light

Metal articles finished by oxidation processes, phosphate treatment, and so on, are said to be rendered lustrous and resistant to corrosion by immersion in Hydrowax Liquid N Light, a solution which is now being marketed by Glyco Products Co., Inc., 230 King St., Brooklyn, New York.

In general use, Hydrowax Liquid N Light may be diluted to the extent of one part of Hydrowax to three parts of water, for the treatment. If unusually high resistance to atmospheric corrosion is desirable, Hydrowax Liquid N Light may be ued without dilution.

The Hydrowax Liquid N Light treatment is said to be particularly useful for the improvement of luster after

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Best For Infra-Red Ray Drying
Nalco Dritherm Lamps are the carbon filament type...proved for years in therapeutic and industrial practice as providing maximum emanation of infra-red ray within the desirable penetrating band. Made only by—
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Made from the highest quality selected ores obtainable in this country and in the same careful and thorough manner as imported emeries.
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coloring and other processes which use molten salt baths or solutions of salts for the production of black or other oxide films. The use of Hydrowax Liquid N Light is of particular interest at this time, since metal shortages have created an unusual demand for highly efficient materials which may be applied to improve surface luster and impart corrosion resistance.

Lewis-Shepard Portable Elevator

No longer is the operation of a hinged portable elevator dangerous, according to Lewis-Shepard Company, 245 Walnut St., Watertown, Mass., manufacturer of materials handling equipment, who has made available for general industry a special spring balance device for easing the raising and lowering of the hinged section of portable elevators where frequent hinging operations are necessary.

The raising and lowering of heavy hinged upper sections, hitherto often a clumsy and difficult operation, is said to be thus made easy and safe. Powerful compression springs wtihin the cylinder balance the weight of the upper frame, which enables one man to raise and lower the frame quickly. The spring balance is said to balance hinged sections 8 ft. in length. The Lewis-Shepard spring balance hinged section for portable elevators can be included on all types of new stackers.

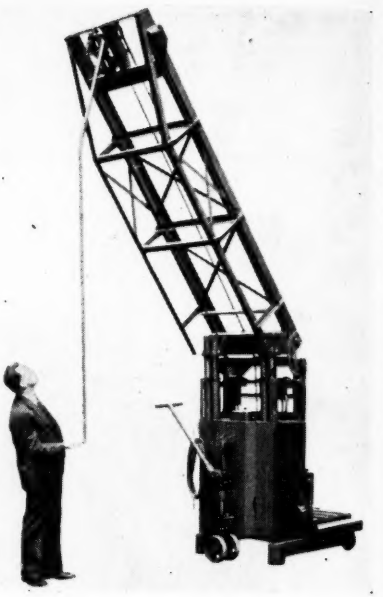

Illustration showing one man balance hinged upper section of a Lewis-Shepard Stacker

Wilbur & Williams Light Gray Totrust No. 30

As a substitute for aluminum paint, The Wilbur and Williams Company, Park Square Bldg., Boston, Mass., is now marketing a material to be known

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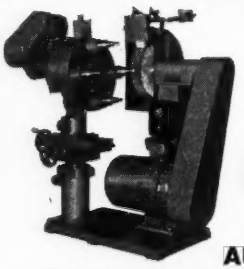

ACME SEMI-AUTOMATIC and Lathe Combination Unit

One of the many Acme Automatics designed to speed up production and reduce production costs. Send sample for free production estimate.

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Superior
ABRASION-RESISTANCE
RUST-RESISTANCE
ECONOMICAL . . .FAST

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ALROSE CHEMICAL CO.
PROVIDENCE, R. I.

as Light Gray Totrust No. 30. This material is said to require two minutes' air drying time.

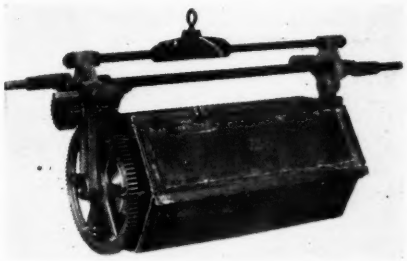
Light Gray Totrust No. 30 is a high gloss, lacquer type vehicle, for spraying, dipping, or brushing. It is a very quick drying material that provides a tough film with exceptional adhesion to even the smoothest surface. It is recommended for finishing of production items where speed in drying is a primary requisite. In addition to being exceptionally tough, the film provided by Light Gray Totrust No. 30 is also flexible.

Hanson-Van Winkle-Munning Shell Casing Processing Equipment

The Hanson - Van Winkle - Munning Co., Matawan, N. J., has developed a Mercil type of equipment for washing, pickling, and rinsing 20 mm. shell casings after annealing. Installations will be made shortly by two well-known concerns. One of these installations will have a Mercil type rotary cleaning unit with a loading compartment. This particular unit is motor driven. An exhaust hood is included for the cleaner tank, and steel cylinders are also included.

The pickling unit consists of a double station hot sulfuric pickling tank, a spray rinse compartment, a cold rinse compartment and a final hot rinse compartment. The pickling compartment is lead lined with lead coils to withstand the hot sulfuric acid used. The warm rinse and spray rinse compartments are also lead lined, a lead coil being included for the warm rinse tank.

The unloading hopper on the warm rinse tank is made of Monel metal with ½ in. perforations and suitable exhaust hoods are included for the hot sulfuric acid pickling compartment. Monel cylinders, 16 in. in diameter by 30 in. long with ½ in. perforations, gears and hangers made of bronze, ¼ in. Monel heads and ⅛ in. body stock are included. Cyl-



Cylinder for processing shell casings

inders of this size hold about 600 to 700 shells. It is noteworthy that shell casings must be drawn, annealed and pickled at least six times.

In another installation the regular soak cleaner is being followed by a cold rinse tank which is in turn followed by a quenching tank. One steel cylinder is used, 20 in. by 30 in. size

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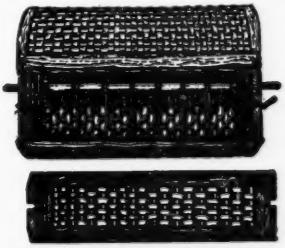

PLATING BARRELS

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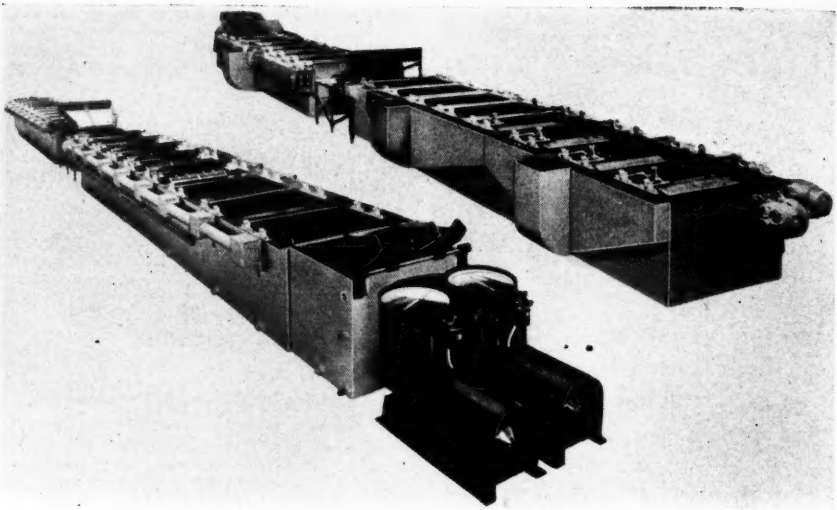
Use them once—you'll use them always

JOHN KING
48 SPRINGFIELD ST., DAYTON, OHIO



(Above, Right) View of same unit looking toward driers and showing exhaust system. (Below, Left) Cleaning, pickling, and rinsing equipment showing hopper-feeding to driers.

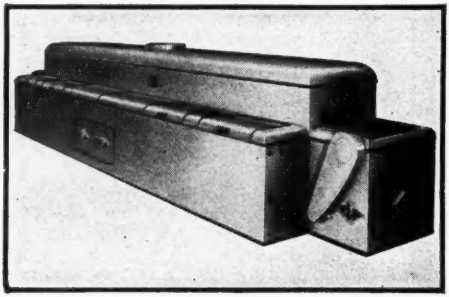
with ½ in. perforations, complete with hangers and gears.

Another operation in this treatment cycle is pickling in a tank equipped with Monel exhaust duct, the tank being lead lined and having a lead coil. This operation is followed by successive rinses in a lead lined tank, a plain rinse tank and a warm rinse tank. Two 16 in. by 30 in. Monel cylinders are used, and on this particular installation each tank operates individually.

Most of this class of work is covered by an A-1-A priority which assures that material as needed can be secured, and shipments can be made in five to six weeks from the receipt of orders.

Dritherm Inside-Silvered Lamps for Infra-Red Ray Heating

Nalco Inside-Silvered Carbon Filament Lamps have been especially developed for infra-red ray processes in drying, baking, heating, and dehydrating by the North American Electric Lamp Co., 1019-A Tyler St., St. Louis, Mo. The pure polished silver in the base end of the lamp acts as a reflector to project the infra-red rays toward the surface being worked on. These lamps are of the carbon filament type, such as are used in many of the car and truck factories for drying the original finish. The manufacturer claims that the red-



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Streamlined design. Hidden motors, pumps and pipes are easily assembled. Piping and nozzles located to insure thorough cleansing of all surfaces. Rugged and efficient pressure pump. Corrosion resistant spray nozzles—from mist to open stream. Monorail, Belt or Gravity type conveyors designed to carry any shape or size material. Variable speeds on conveyor drive synchronize production.

International Conveyor & Washer Corp.
Write for circular.
640 E. FORT ST. DETROIT, MICH.

ray emanation from the carbon filament falls in the more desirable band on the Angstrom scale for maximum drying efficiency.

Nalco Inside-Silvered Lamps are available in the model R-40, 250 watts,

Dritherm Inside-Silvered Lamps for Infra-Red Ray Heating

110-120 volts. Clear glass infra-red lamps are also available in the model PS-30 and the G-25. The clear glass types require separate reflectors which the manufacturer can furnish in the gold-plated or aluminum.

Careyclad

A protective metal coating known as "Careyclad" for iron sheets, structural steel, metal buildings, bridges, heavy machinery, ornamental iron work, duct work, sheet metal items, and similar construction has been placed on the market by The Philip Carey Mfg. Co., Lockland, Cincinnati, Ohio. Extensive tests are claimed to prove that this product is equal or superior to red lead coatings and lead coatings pigmented with carbon black. Careyclad may be applied by spray, brushing, or dipping at normal temperatures.

Careyclad will protect metal against rusting, mild acid air concentrations, mild alkaline air concentrations, and temperatures of 125 to 250 deg. F. It is black in color and can be painted over with asphalt base aluminum paint, after which, if some other color is desired, it can be painted with various types of prepared paints.

Upon exposure to weatherometer tests, a piece of black iron sheet covered with this coating and bent double showed no signs of fracturing or weathering in a period of time equivalent to three years of actual service.

Falcon Booster Heater

H. O. Swoboda, Inc., 200 13th St., New Brighton, Pa., announces production of a new line of Falcon Electric Immersion Type Booster Heaters for maintaining and increasing temperatures of a wide range of materials. The heaters are available in capacities ranging from 10 k.w. to as much as 1,000 k.w. output. In many coating and saturating processes involving the use of heated asphalts, resins, varnishes, insulating varnishes, and so on, it is neces-

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FINISH BAKING FOR DEFENSE NEEDS DESPATCH EFFICIENCY

- *Proper body construction*
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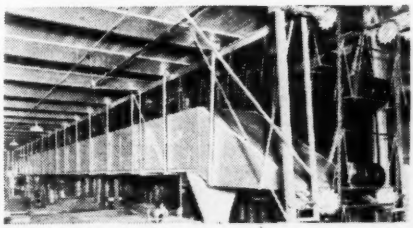
- *Proper heat distribution and air circulation*
- *Proper material handling*



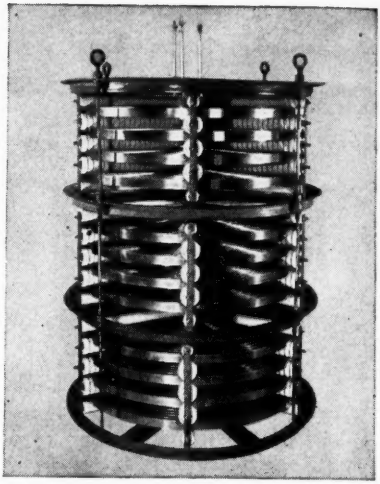
This is a Despatch conveyor type oven used for baking finish on oil drums.

DESPATCH OVEN COMPANY
MINNEAPOLIS, MINNESOTA

ary to increase or maintain temperature of the material by applying heat in the line between storage tank and the container where processing occurs.

Consisting of spirally coiled heater strips arranged to form a compact unit, the heater is installed in a sealed tank built in the pipe line between storage vessel and coating or saturating tank. Temperature is maintained uniformly by means of automatic controls, either thermostat or pyrometer with thermocouple. Only two simple connections are necessary for connecting the heater to the electric circuit.

The Falcon Booster Heater is applicable for use with any materials having electrical insulating properties (non-conductors). In operation, the "bare" electric coils are immersed in the material to be heated. In this manner a direct thermal contact is established, insuring practically all the heat generated being transferred to the material, and providing an improvement over the ordinary radiant and strip heaters normally used on the exterior of tanks. Due to the large surface area of the heating elements, and the fact that the heater is designed for operation at an extremely low watt density per unit of heat transfer surface, no temperature gradient is set up between heater and material. This prevents disintegration accompanying other methods which operate at higher surface temperatures than that of the charge.



Falcon Booster Heater

This type of booster heater, under the conditions outlined above, can be employed advantageously in a wide variety of manufacturing operations. It can be furnished in numerous sizes and heat capacities according to customer specifications.

Alsop Multiple Filter

A large capacity filter for plating solutions and metal cleaning solvents in a multiple type has been placed on the market by Alsop Engineering Corp., 1

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BETTER CLEANING
BETTER PLATING
with
ORVUS
(A SULFATED FATTY ALCOHOL)
in your alkaline cleaning bath!
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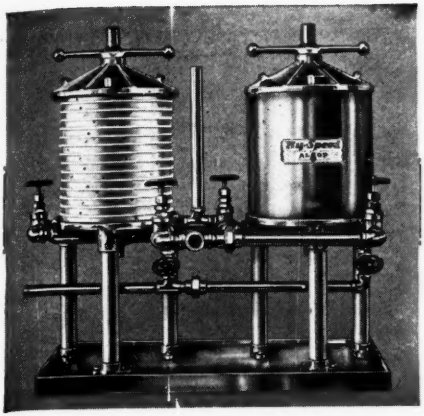

Alsop Multiple Filter

Temple St., Milldale, Conn. The multiple filtering unit is an adaptation of the Alsop Hy-Speed principle of large filtering areas in comparatively small space.

The Alsop Multiple Filter unit is said to remove dust, dirt, and other foreign material from contaminated solutions. Removal of this material from plating solutions assures better plated surfaces.

According to the manufacturer, inexpensive filter discs are used as the filtering medium and can be disposed of after using. New filters can be inserted in a minimum of time. By means of the Alsop Multiple type filter unit, one section can be cleaned while the other section continues to function.

The Alsop Multiple Filter is available in various sizes and constructed of bronze, stainless steel, Monel metal, or other suitable metals.

Protecto Medicated Masks and Caps

Protecto Medicated Masks and Protecto Caps for use as protection in industry where non-toxic, silica-free nuisance dusts cause discomfort have been placed on the market by Modern Industrial Products, 17 W. 45th St., New York, N. Y. Protecto Medicated Masks and Protecto Caps are feather-light, soft, cool, and non-irritating. The masks are shaped to fit the nose and mouth snugly and permit free breathing. The caps cover the hair completely.

Microscopic computations show the largest pores of the material used in Protecto Masks and Caps to be 0.0029 sq. mm. According to the manufacturer, the mask protects workers from inhaling nuisance dusts which cause frequent sneezing, spitting, coughing, and nose-blowing, and the subsequent lowering of efficiency. The caps protect hair and scalp from dust and other particles which may cause serious irritation.

As an extra safeguard, the masks are medicated with a soothing, pleasant preparation that is said to protect workers against contagious cold germs and lowers the possibility of passing colds from one workman to another.

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The product of a thousand uses. Speeds up finishing and polishing after grinding and abrasive operations. Nothing like it! Clean, easy to handle. Leaves a bright, smooth surface.

Prompt Deliveries — Order from your mill supply house.

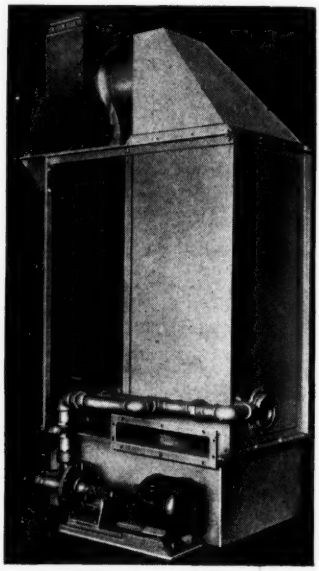
BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO. NEWARK, N. J. U. S. A.

Hydro-Whirl Dust Collector

The new Hydro-Whirl Dust Collector developed by the Industrial Sheet Metal Works, 630 E. Forest Ave., Detroit, Mich., marks a notable advance in industry, since it removes all of the hazards that have attended the processing of magnesium and its alloys. Manufacturers can now feel more secure in using this material to a greater degree than they ever have before. Every metal today plays an important part in the defense program and none should present any restrictions to use.

The dust created by buffing, polishing, and grinding of parts is effectively trapped by the Hydro-Whirl, the functional part of this new dust collector, and is brought down into a tank. Thus, practically all the insidious dust is removed from the area of operations and is transformed into an inactive element in the form of a sludge which is later either burned or buried in the ground.

Many units are already in use by leading parts manufacturers who are



Hydro-Whirl Dust Collector

now utilizing magnesium in larger volume. The outstanding performance of these units has attracted the attention of a number of renowned chemical engineers whose chief interest is safety in industry. Insurance companies and fire protective associations, too, have recognized the safety factors apparent in this new development.

The Hydro-Whirl is an entirely new principle in wet dust collecting and is effective on all types of metal dust, not only magnesium but aluminum, iron, steel, and others as well. The working mechanism consists of a rotating shaft on which are centered a series of discs. The controlled rotating speed of the

IRCOLENE

WILL MEET YOUR RUST PREVENTING NEEDS

1. Ircolene protects all metal surfaces — on bright or machined surfaces where temporary rust prevention is desired.
2. Ircolene protects finished parts stored away for later assembly or which are shipped to other locations for assembly.
3. Ircolene is applied by dip or spray—or can be applied by brush.
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Write for Ircolene No. 19 bulletin

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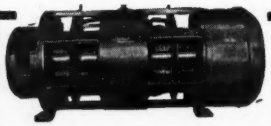

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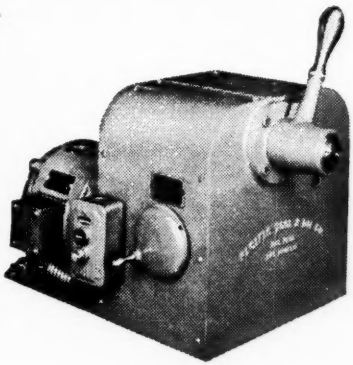
shaft in a horizontal plane throws a rain of water into the baffled section of the unit at which point the dust is whirled out of the air stream. Scientific calculations have attained a proper balance between the velocities of air and water. This balance is said to insure thoroughly cleaned air which may be returned to the building.

Pacific Vera-Lathe

A polishing and buffing lathe with an infinite number of variable spindle speeds from 1,250 to 5,000 r.p.m. to be



Pacific Vera-Lathe

known as the Pacific Vera-Lathe has been placed on the market by Pacific Tool & Die Co., 1225 E. 63rd St., Los Angeles, Calif. This unit is said to be equipped with a hollow spindle design and a novel collet operating mechanism.

The collet operating mechanism is said to save a great amount of time by permitting the spindle to rotate while the work is inserted into the collet and is said to eliminate wear usually caused on machines that must be stopped in order to chuck the work. The collet is available for foot operation if desired. Interchangeable spindles can be furnished to accommodate a chuck for other operations.

The spindle is ball-bearing mounted on specially selected bearings. The spindle has a hole its entire length through which passes a hollow draw tube with a $\frac{13}{16}$ in. bore for holding the $\frac{3}{4}$ in. maximum capacity collet. The tension of the collet can be easily adjusted to the proper required amount by a simple turn of a round adjustment handwheel located on the back end of the spindle. It is also simple to change collets by this same handwheel.

Various spindle speeds are quickly obtained by the turning of a handwheel located on the side of the Pacific Vera-Lathe for selecting the proper and most efficient speed for the work in question. Usually high speeds are required for polishing and buffing, while the lower ranges are found more suitable for burring and filing.

While the speeds normally offered are 1,250 to 5,000 r.p.m., in infinite variation, other combinations can be fur-

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RUST INHIBITIVE

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1. Very fast air-drying
2. Water-whiteness
3. Tenacious adhesion
4. Hardness combined with flexibility

and

RUST RESISTANCE

S-310

is used and recommended as a clear coating for hand tools, machine tools, hardware and wherever a clear protective coat for bright metal is required.

The Varnish Products Co.
5208 Harvard Ave. Cleveland, Ohio

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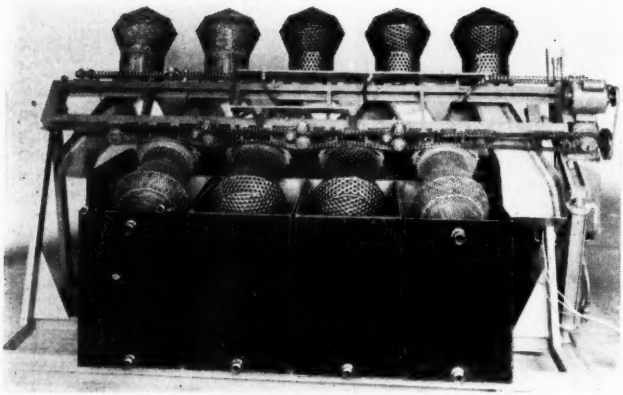


Udylite Automatic Machine for Cleaning and Plating Small Parts

nished on request. The Pacific Vera-Lathe is motorized with a ½ h.p. electric motor, either single or three phase (optional) and is completely wired, including starting switch, and ready to run.

Udylite Automatic Machine for Cleaning and Plating Small Parts

The development of a full automatic barrel cleaning and plating machine for handling small parts in bulk has been announced by The Udylite Corporation, 1651 E. Grand Blvd., Detroit, Mich., manufacturer of plating and polishing machinery.

Several of these machines are now in operation and have proved to be extremely satisfactory. They are particularly adaptable to the processing of parts for ordnance. Several such machines are being used to automatically zinc plate machine gun clips in continuous production; machines are being used to handle 20 mm. brass cartridge shell cases as the latter are subjected to the various cleaning, rinsing, and pickling operations. Other machines are being employed to zinc and cadmium plate aircraft engine parts continuously.

The manufacturer states that this new machine offers radical improvements over existing machinery and makes possible the complete finishing of small parts with absolute minimum of labor expense. The machine is completely automatic in that the parts are progressively subjected to the various cleaning, rinsing, pickling, plating, and drying operations without manual handling.

The automatic transfer greatly reduces the man hours necessary to process small batches of work through the various solutions. The only manual labor required is at either end of the machine. This is said to eliminate 8 to 10 hand operations. According to the manufacturer, the operators using this machine do not need rubber gloves, boots, or aprons and do not come in contact with the material after it is loaded until it is discharged clean and dry. No baskets are needed to transfer the work from one solution to another. The tanks in the plating barrels have sufficient anode and solution capacity to maintain the correct metal content without addition of metal in the form of salts.

The entire machine is driven by one motor. This eliminates the need for individual motor drives and the accessories such as starters, conduit, and so on. The machine is shipped complete, ready to connect to the water, air, and electric supply and, it is stated, will greatly reduce the amount of labor and material needed in a manually operated layout.

YOU SHOULD CLEAN BEFORE CHROME
NATROLIN "B-4 Chrome"
IS THE THING. TRY ON APPROVAL. SAMPLE? YES. SERVICE? SURE!
SULPHUR PRODUCTS CO. (The "Liquid Sulphur" People) Greensburg, Pa.

The removal of the operator from over the tanks is said to increase his productive capacity as he is not endangered by fumes or cyanide burns. Also, there is no chance of his transferring work directly from the cyanide to the acid tank which would generate deadly cyanide acid gas.

The amount of work processed in a day is not governed by the operator and each batch of parts is given the exact treatment designated by the time clock on the machine. The machine is timed by an electric clock and cannot be slowed down or speeded up by an unauthorized person. The simple design eliminates many expensive moving parts and permits easy access to the barrels for removal or repair.

The Udylite Automatic barrel is designed to process bulk parts in large or small quantities and give the plating room a machine comparable to the automatic screw machines, punch presses, and so forth, long accepted as commonplace in other production departments.

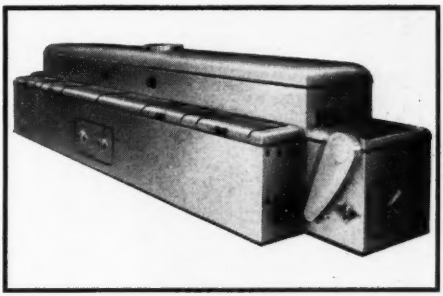
International Belt Type Conveyor Wash and Rinse Unit

A streamlined, belt type, wash and rinse unit with all parts enclosed has been placed on the market by International Conveyor & Washer Corporation, 640 E. Fort St., Detroit, Mich. Quick opening panels are located at each pump. Ventilators and louvers for the pump motors are also provided. The drive chain and shear sprocket are also provided with a guard.

Cast doors are located on the side of housing at each spray section to facilitate the cleaning of nozzles and the removing of spray headers. The belt type conveyor wash and rinse units is available equipped with blow-off ducts and fans, as well as steam unit heaters or gas fired unit heaters.

A false roof in the top located approximately 18 in. from each end of the housing is said to provide adequate ventilation. A drain pan is placed underneath the conveyor over the solution tank which delivers the solution that is sprayed on the work to one end of the solution tank. and then flows back in a circuitous path over sludge baffles and through a removable screen and into the pump. This allows the flow of liquid to be at a minimum speed and allows particles to settle out of the solution.

A series of spray pipes under the conveyor are placed crosswise to the machine and extend to a suction chamber at the side. By opening the cover of the one chamber, the pipes may be removed and the nozzles cleaned in a very convenient manner.



International Belt Type Coneyor Wash and Rinse Unit

The International Belt Type Conveyor Wash and Rinse Unit is furnished with steam coils and injectors for the heating of the solution or with gas fired units. The gas units are available with full automatic controls.

THE ADIRONDACKS GORE MOUNTAIN CRYSTAL GARNET ORE

ABRASIVE GARNET

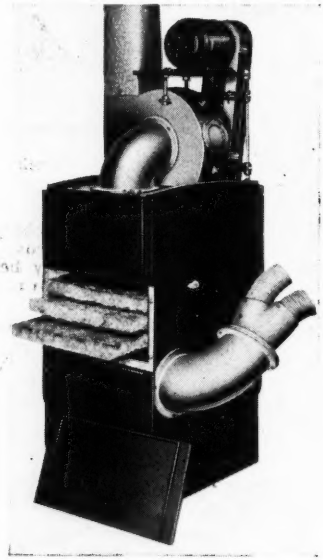
For
Abrasive Paper and Cloth
Grinding Wheels
Sand Blast
Minus 300 Mesh for
Polishing and Lapping
Grades for Barrel Finishing

Ample Stocks Insure Prompt Shipment

BARTON MINES CORPORATION
NORTH CREEK, WARREN COUNTY, N.Y.

Hisey Combination Exhauster and Filter

The Hisey-Wolf Machine Co., 2745 Colerain Ave., Cincinnati, Ohio, has placed on the market a combination exhauster and filter for polishing and buffing machines. Dust laden air enters a cyclone collector removing coarse particles and, after passing through impingement-type filters which arrest the fine dust, is said to be so clean that it can be recirculated in the room after leaving the fan of the unit. The motor is externally mounted, thus assuring cool and clean operation.



Hisey Combination Exhauster and Filter

A handy clean-out is provided for heavy particles which are carried into the unit. The filters are readily removed for cleaning by shaking. The large fan and motor with which the Hisey Combination Exhauster and Filter is equipped provide high static pressure yet are comparatively quiet in operation.

Ad-Lea-Sive

A blended glue-base adhesive to be known as Ad-Lea-Sive has been placed on the market by The Lea Manufacturing Co., 22 Cherry St., Waterbury, Conn. According to the manufacturer, this material can be used as a substitute for polishing wheel glue in which it is used not only for precoating the wheel but also for bonding the grain to the wheel.

Ad-Lea-Sive can be used as a simple precoating material for a clean polishing wheel after which ordinary glue and grain can be applied in the usual manner. It also can be used as a precoat on sewed buffs and polishing wheels prior to the use of Lea compound for producing setup wheels comparable to standard wheels 120 grit and finer to be used on ferrous metals.

Ad-Lea-Sive is a heavy liquid which may require occasional thinning out with water. The original consistency is said to be correct for average use. The material is available as a firm jelly-like material which in the cold state is almost jet black. It is placed in 1, 5, and 50 gal. containers from which it can be easily scooped out. One gallon is said to equal approximately 8½ pounds.

A few of the qualities of Ad-Lea-Sive are as follows: Exceptional penetration, high-bonding strength for abrasive grains, good flexibility, quick setting up of wheels, longer wheel life, and high resistance to bacterial action.

Wiegand Type HF Blower Unit Heater

A blower type electric heater rated at 1,500 to 4,000 watts for operation on 115 or 230 volts, 60 cycle, a.c., and 115 or 230 volts d.c. to be known as the Type HF has been placed on the market by Edwin L. Wiegand Company, 7500 Thomas Blvd., Pittsburgh, Penna.

Chromalox Koilstrip heating elements are used in conjunction with a quiet operating, cadmium plated fan, which is driven by an enclosed type electric motor. The fan is said to provide an air temperature rise of 32 to 75 deg. F. at an air velocity of 130 to 180 f.p.m., de-

For a real good polishing job use

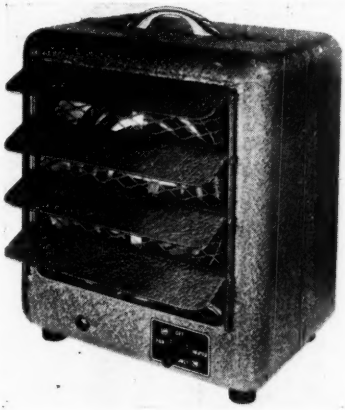
KEYSTONE EMERY

TURKISH — NAXOS — AMERICAN

KEYSTONE EMERY MILLS *Write for Sample* 4316 Paul St., Phila., Pa.

pending upon the rating. The Type HF Blower Unit Heater is designed for portable or permanent wall mounting.

The adjustable louvres are coated with a gray crinkle lacquer finish. A



Wiegand Type HF Blower Unit Heater

manual control switch and positive acting thermostatic switch in the heater circuit are provided for protection against over-heating if normal temperatures are exceeded.

"Safety" Floor Cleaning Compound

A compound which is said to pick up oil and grease from floors to be known as "Safety" Floor Cleaning Compound is now being marketed by Fisher Equipment Co., 6315 Ellsworth Ave., Detroit, Mich. "Safety" Floor Cleaning Compound is a natural product and is merely sprinkled on floors and allowed to absorb oils and greases, which it does in a few minutes or hours, and is then swept away. In some cases the cleaning compound can be used over and over.

This inexpensive compound is a dry, granular material, having a particularly high affinity for oil and grease. It is itself non-flammable and contains no acid or other artificial ingredient. Fire hazards from oil and grease impregnated flooring are entirely eliminated.

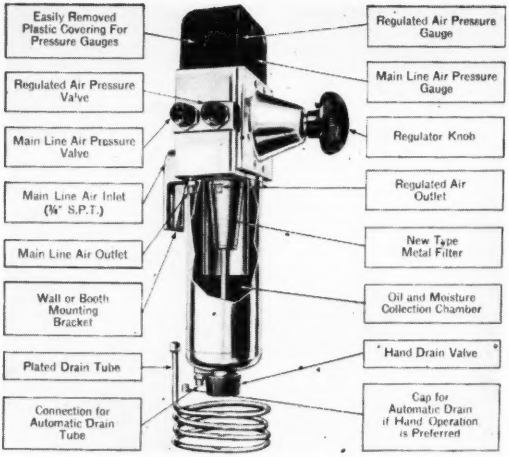
Particularly important is the fact that slipperiness due to oily and greasy floors is said to be immediately eliminated upon spreading a thin layer of this Safety Floor Cleaning Compound on the floor, thus eliminating completely all hazards due to slipping. Weekly scrubbings with caustics and lyes are eliminated.

Binks Large Capacity Oil and Water Extractor

Binks Manufacturing Company, 3114-40 Carroll Ave., Chicago, Ill., recently announced the marketing of a new large capacity oil and water extractor known as Binks E-75. This new extractor has a rated capactiy of 75 c.f.m., at 60 to 70 lbs. pressure, and has two main line air outlets, as well as two regulated air outlets.

Designed to meet the needs of a larger capacity extractor and ample to handle the air needs of several modern spray guns at low or high pressure, the new E-75 incorporates all the latest features of modern streamlined designing. In this new E-75 extractor, the Binks Manufacturing Company has incorporated a new air cleaning principle with a highly efficient metal filter which is said to thoroughly clean, but does not impair the free flow of air.

Another outstanding feature is the achievement of a more uniform air pressure, due to an improved large capacity air regulator which is part of the


Easily Removed Plastic Covering For Pressure Gauges
Regulated Air Pressure Valve
Main Line Air Pressure Valve
Main Line Air Inlet (¼" S.P.T.)
Main Line Air Outlet
Wall or Booth Mounting Bracket
Plated Drain Tube
Connection for Automatic Drain Tube
Regulated Air Pressure Gauge
Main Line Air Pressure Gauge
Regulator Knob
Regulated Air Outlet
New Type Metal Filter
Oil and Moisture Collection Chamber
Hand Drain Valve
Cap for Automatic Drain if Hand Operation is Preferred

Binks Large Capacity Oil and Water Extractor

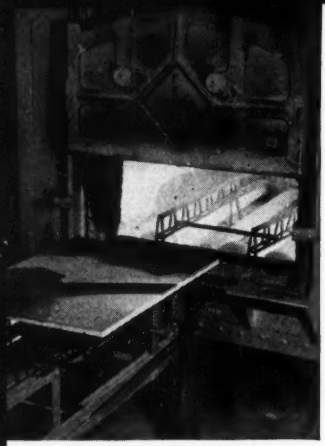
unit. The accompanying illustration shows other interesting details on the construction of this extractor.

Facts about Towmotor. Data sheets giving detailed specifications on the seven models of Towmotor gasoline-powered lift trucks, capacities from 2,000 to 10,000 lbs., are now being issued by Towmotor Company, 1214 E. 152nd St., Cleveland, Ohio. Also included is a summary of the Towmotor "unit-load" handling features, such as speeding production, increasing storage capacity, and reducing handling costs. In addition, each page discusses in detail one problem of industrial handling. These data sheets make up an informative, authoritative book for plant managers, engineers, and other executives for use in checking present handling methods and developing improved handling systems for the future. Present Towmotor users are shown how to get the most out of machines and how to select models that will team up with ones in service.

Copies of these data sheets will be sent free upon request.

The Finishing Touch *By J. A. Patterson*

"You can't blame the paint for this."



FOR YOUR Catalog LIBRARY

To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.

1. Dermaply Ointments
Ointments for treating industrial dermatitis are described in a folder now being issued by Nielco Chemical Company, 19720 Florence Rd., Detroit, Mich.

2. GKS Truck Type Baking Ovens
A beautifully illustrated and informative 8-page catalog describing the flexibility, construction, and operation of truck type ovens is now being issued by George Koch Sons, Inc., 2112 Pennsylvania St., Evansville, Indiana.

3. Penetrating Protective Paints
A completely illustrated six-page catalog on the subject of rust preventive oil paints is now being issued by The Wilbur & Williams Company, Park Square Bldg., Boston, Massachusetts.

4. Facts About Towmotor
A complete catalog containing Towmotor operating data sheets is now being published by Towmotor Company, 1214 E. 152nd St., Cleveland, Ohio.

5. Thiokol Facts
Thiokol Corporation, 780 N. Clinton St., Trenton, N. J., is now publishing a bulletin containing data on the uses of synthetic rubber in defense.

6. Pacific Vera-Lathe
A variable spindle speed lathe for handling small round parts is described in a catalog now being issued by Pacific Tool & Die Co., 1225 E. 63rd St., Los Angeles, California.

7. Ad-Lea-Sive
A description of what Ad-Lea-Sive is and how it can be used is the basis of information contained in a folder now being issued by The Lea Manufacturing Co., 22 Cherry St., Waterbury, Conn.

8. Chromium Chemicals
The discovery, development, and use of chromium chemicals are outlined in a 36-page booklet entitled "Chromium Chemicals" which is now being issued by Mutual Chemical Company of America, 270 Madison Ave., New York City.

9. Profits in Air
The manner in which electrostatic air filters help industrial plants eliminate losses resulting from contamination of products by dust, smoke, and fumes is described in a four-page folder which is now being issued by American Air Filter Co., Inc., 242 Central Ave., Louisville, Kentucky.

10. Industrial Washing Machines and Conveyors
A folder telling how seven famous companies solved their product washing problems is now being issued by The Alvey-Ferguson Company, 75 Disney St., Cincinnati, Ohio.

11. Heavy Duty Grinders and Buffers
The complete line of Marshke Heavy Duty Grinders and Buffers manufactured by Vonnegut Moulder Corporation, 1845 Madison Ave., Indianapolis, Ind., is illustrated and described in a 22-page catalog now being issued by the company.

12. Metal Conditioner and Cleaner
A corrosion solvent process designated as Corrosol No. 6 for use in protecting metal and prolonging life of paints is described in a folder now being issued by International Rustproof Corporation, 12507 Plover Ave., Cleveland, Ohio.

13. Hammond Variable Speed Lathe
A four-page folder illustrating and describing a method by which speed changes of 1,500 to 3,000 r.p.m. can be obtained instantly on the Hammond VRO Polishing and Buffing Lathe is now being issued by Hammond Machinery Builders, Inc., 1622 Douglas Ave., Kalamazoo, Michigan.

14. Industrial Ovens
A 20-page catalog covering oven construction, method of heating, source of heat, and material handling is now being issued by J. O. Ross Engineering Corporation, 350 Madison Ave., New York City.

15. Clean Air
A folder telling how clean air is provided in America's blacked out factories is now being issued by American Air Filter Co., Inc., 254 Central Ave., Louisville, Kentucky.

16. Du Pont High Speed Brass
The Electroplating Division of E. I. du Pont de Nemours & Company, Wilmington, Del., is now issuing a catalog describing an electroplating process for the rapid production of smooth, bright brass deposits.

17. New Wrinkles in Finishing
Vol. 3, No. 3 of this publication contains 12 pages of pertinent information on the application of Wrinkle Finishes marketed by New Wrinkle, Inc., Mutual Home Bldg., Dayton, Ohio.

18. Airway Ventilated Buffs
Cool cutting buffs for high speed buffing operations are illustrated and described in a 4-page folder now being distributed by Jackson Buff Corporation, 20-03 41st Ave., Long Island City, New York.

19. Finishing Equipment Catalog
A very complete catalog illustrating and describing finishing equipment of all kinds is now being issued by Industrial Sheet Metal Works, 630 E. Forest Ave., Detroit, Michigan.

20. Metal Cleaning Tips
The chemical classification and selection of alkaline metal cleaners is contained in a bulletin which has been prepared and is now being distributed by the Cowles Detergent Company, 7016 Euclid Ave., Cleveland, Ohio.

21. Textured Enamel Finish
An improved textured enamel finish known as Rincontrol is fully illustrated and described in a folder now being issued by Roxalin Flexible Lacquer Co., Inc., Box 713, Elizabeth, New Jersey.

22. General Electric Immersion Heaters
Bulletin GEA-3195 now being issued by General Electric Company, Schenectady, N. Y., tells how to heat electroplating baths with General Electric Immersion Heaters.

Print plainly in filling out coupon for literature.

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